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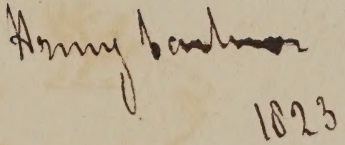

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TREATISE

ON

RUPTURES,

CONTAINING AN

ANATOMICAL DESCRIPTION OF EACH SPECIES:

WITH

AN ACCOUNT

OF ITS

SYMPTOMS, PROGRESS, AND TREATMENT.

THE SECOND EDITION,

CORRECTED, AND VERY CONSIDERABLY ENLARGED.

By WILLIAM LAWRENCE,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, AND DEMONSTRATOR OF ANATOMY AT ST. BARTHOLOMEW'S HOSPITAL.

"Tout praticien peut à la vérité remarquer quelques faits extraordinaires, acquérir par l'exercice de son art quelques connoissances intéressantes, inventer quelques moyens particuliers dont on n'a point encore parlé; et ce sont ces mêmes nouveautés qui enrichissent peu-à-peu l'art de guérir. Mais cette experience propre à chacun n'est qu'un point, en comparaison de l'expérience générale qui s'est formée par le concours des découvertes et des observations qui nous ont été transmises par une multitude de praticiens qui ont vécu en différens tems et en différens lieux." HEVIN in the *Mémoires de l'Acad. Roy. de Chirurgie*, tom. I. p. 500.

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TO

EDWARD ROBERTS, M.D. F.R.S.
RICHARD POWELL, M.D.
JAMES HAWORTH, M.D.

THE PHYSICIANS OF ST. BARTHOLOMEW'S HOSPITAL;

AND

SIR JAMES EARLE, F.R.S.
SIR C. BLICKE, and
L. HARVEY, Esq.

THE SURGEONS OF THE SAME HOSPITAL;

THIS TREATISE

IS RESPECTFULLY INSCRIBED,

AS A MARK OF GRATITUDE FOR THE PROFESSIONAL INFORMATION DERIVED FROM THE OBSERVATION OF THEIR PRACTICE, AND FOR THE MANY OTHER FAVOURS CONFERRED BY THEM,

ON THEIR OBEDIENT SERVANT,

THE AUTHOR.

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TREATISE

ON

RUPTURES.

CHAPTER I.

GENERAL DESCRIPTION OF RUPTURES; AND ENUMERATION OF THE VARIOUS SPECIES.

IF there be any disorder, which, from the frequency of its occurrence, and from the variety of forms, under which it is presented to the care of the surgeon, demands more than others his most minute and attentive investigation, in every part of its history and treatment; such, assuredly, is that which forms the subject of the following pages. Surgeons of great experience in the treatment of ruptures have estimated, that one-

eighth,* or one-sixteenth of the human race is afflicted with this complaint; which affects, indiscriminately, persons of both sexes, of every age, condition, and mode of life.

It is true, indeed, that a hernia, if properly managed, is not immediately dangerous to the patient; does not affect his health, nor materially diminish his enjoyments: but it is a source of

* See ARNAUD in his preface; his statement is adopted by GIMBERNAT, p. 1. Mr. TURNBULL, Surgeon to the London Rupture Society, asserts, on the authority of "the most diligent and general enquiries throughout the kingdom," that the proportion of the ruptured to the whole population is one in fifteen, including persons of all ages, and both sexes.—*Manual, &c. Introduction*, p. 10. JUVILLE, a celebrated truss-maker in Paris, found that the number of subjects with herniæ was about one-thirtieth of the population in Germany, and the North of Europe; one-fifteenth in Italy and Spain; and one-twentieth in France and England.—*Traité des Band. Hern.* p. 21, 22.

My readers will probably not be disposed to rely very implicitly on these, or any similar statements. They appear to be manifestly exaggerated. Mr. LOUIS ascertained the number of patients with herniæ in the different hospitals of Paris. We should expect to find a greater proportion here, than in mankind at large, since these very disorders compel many to seek relief at such institutions; yet it will be seen that the proportion is not so high as the quotations above make it. Of 7027 persons in the Salpêtriere, 220 were ruptured; at the Bicêtre, 212 out of 3800; at the Invalides, 142 out of 2500, or 2600; and of the children at the Hôpital de la Pitié, 21 in 1037.—*Memoires de l'Acad. de Chir. t. 5. Supplement*, p. 885.

constant danger, since any violent exercise or sudden exertion may bring it from a perfectly innocent state into a condition, which very frequently proves fatal. The ordinarily harmless nature of these swellings increases the patient's risk, by averting suspicion, and leading him to neglect the means of security and prevention.

The numerous situations in which ruptures may occur, the disorders with which they may be confounded, the very different states in which their contents exist, and the minute anatomical knowledge necessary for operating on them, bestow a peculiar importance on the subject, and require to be studied with the most anxious interest by every man, who wishes to practise his profession with honor to himself, and advantage to his patient. The treatment of ruptures demands, from all these circumstances, as great a combination of anatomical skill, with experience and judgment, as that of any disorders in Surgery.

Section I.

General Description of Ruptures.

Surgeons have established three general divisions of herniæ, according to the three principal circumscribed cavities of the body; viz. those of the head, chest, and abdomen. The latter only are the subject of this work; and they are by far the most numerous class. The mobility and varying bulk of the viscera, the pressure which they experience in all considerable efforts and motions of the body, and the yielding nature of the containing parietes are circumstances greatly facilitating the origin of these complaints.

The passage of any of the abdominal viscera, from the cavity in which they are naturally contained, into a preternatural bag, formed by the protrusion of the peritoneum, constitutes a *hernia*,*

* The origin of this word has been variously explained: some derive it from ερνος, a branch; others from hæreo, or the old adjective, hernius, hard or rugged. The Greek κηλη, a swelling, from which the termination, *cele*, in the nomenclature of ruptures is derived, has been drawn from κηλεω noceo, or χαλαω laxo.

or *rupture*, according to the most common acceptation of these terms.*

The protruded portion of peritoneum is called the *hernial sac*. This, with its contents, either passes through some natural opening in the abdominal parietes, as at the ring; or is forced through some part, where there is ordinarily no perforation. The cavity of the rupture is, therefore, continuous with that of the abdomen; and is lined by a prolongation of its serous membrane. The same causes, which first produced the complaint, or others of an analogous nature, are constantly tending to promote its increase. Hence the peritoneum, feebly opposed by the cellular membrane, and integuments, is extended

* The term is employed frequently in a more vague sense. Various affections of the testis, its coverings and vessels, have been denominated *false*, in contra-distinction to those above defined, or *true* herniæ. They do not fall within the scope of the present work. Again, herniæ have been distinguished as *internal* or *external*: the latter consisting of obvious tumours formed in the mode indicated by the definition; while the former are instances of strangulation caused by certain internal changes of position, not indicated by external swellings, as when the bowels pass through an aperture in the diaphragm, or are confined by preternatural bands of adhesion. A compliance with common usage, which regards these as species of hernia, leads me to notice them in this work, although they do not come under the definition. The existence of a peritoneal covering is not essential to the notion of a hernia; since that of the bladder wants this character.

so as to form a bag of various size and figure, communicating with the abdomen by a comparatively small opening, called the *mouth of the sac*. The contracted part between the mouth, and the point at which the membrane begins to expand, is the *neck*; and the most distant point from the abdomen, which is generally at the same time the largest, has been termed the *fundus* of the sac.

The peritoneum, which always immediately surrounds the protruded viscera, retains generally the same thin and delicate structure, which characterises the membrane in its natural situation. The peritoneal sac is covered by another investment of various degrees of thickness, differing according to the part in which the swelling is formed, and sometimes even double. Probably this is formed, in great part, of the surrounding cellular substance, condensed into a membrane-like appearance, by the pressure of the hernia, in the same way as tumours acquire their investing cyst. The thickness of the sac, taken altogether, depends on these adventitious coverings, the peritoneum changing very little. They acquire considerable density and firmness in old ruptures: thus the sac has been seen of six lines in thickness.* It may be found in the opposite state, or remarkably thin.

* Arnaud, *Mémoires de Chirurgie*, t. 1, p. 53. In a

We should hardly have supposed, *a priori*, that the peritoneum is susceptible of such considerable extension as it frequently suffers in cases of hernia. Scrotal ruptures often descend to various distances on the thigh, sometimes indeed even to the knee; yet the whole inner surface of the bag, in which all the loose viscera of the abdomen may be contained, is lined by a continuation of peritoneum; indeed the hernial sac is generally thicker and stronger in proportion to the size of the tumour, and to the duration of the complaint. Yet, occasionally, instead of an increased thickness, we observe the opposite process of absorption or thinning, in large ruptures: in some cases the coverings are so reduced, that the convolutions and vermicular motions of the intestines may be distinguished through the skin; hence, it may appear that the sac is entirely wanting; but it will be possible to trace it in the neighbourhood of the opening. The contents of a rupture may be found immediately under the skin, when the hernial sac has been burst by a blow;* but this is an unfrequent occurrence.

The exterior covering is every where closely

femoral hernia he found the coverings so thin, and the integuments so firmly consolidated to the sac, that the first cut penetrated its cavity.—Ibid.

* Cooper, pt. I, p. 3.—*Supplément au Traité de I. L.* Petit *sur les Mal. Chir.* p. 113.

connected by cellular substance to the proper peritoneal sac. Hence the latter part is not returned into the abdomen, when the contents of the swelling are replaced; but remains behind, ready to receive any future protrusion. At the first moment of the occurrence of a hernia, the protruded peritoneum must of course be unconnected to the parts among which it lies. But adhesions take place so quickly that we find the sac universally connected to the contiguous parts, even in a rupture of a few days standing: and these connexions become afterwards so strong and general, that we might suppose the hernial sac to have been originally formed in its unnatural situation. The difficulty, which this structure would occasion, in separating the hernial sac from the surrounding parts, and particularly from the spermatic chord, constitutes an insuperable objection to any proposal for returning the sac into the abdomen, and must have been a source of great danger in some of the old methods of attempting the radical cure of ruptures.

It has been asserted, that herniæ, under certain circumstances of rare occurrence, do not possess peritoneal sacs. The antients believed such cases to be very common; and supposed the protrusion to take place in consequence of an actual laceration of the peritoneum. The English word, *rupture*, and the equivalent terms in

some other languages, indicate an opinion of this kind, which might naturally arise from a superficial observation of the circumstances frequently attending the origin of the complaint. The older surgeons, conceiving the peritoneum to be incapable of sudden extension to a sufficient degree, distinguished the herniæ of sudden origin from those of more gradual development, in which they admitted the existence of a sac. In reference to the mode of their formation, they called the former, herniæ by rupture; and the latter, herniæ by dilatation. Experience has shewn this distinction to be unfounded; and has proved that ruptures of both descriptions have sacs:—a conclusion, which correct anatomical views would certainly have suggested. When I consider the texture of the peritoneum, and the mode of its connexion to the abdominal parietes, I cannot fancy any attitude or motion that could possibly tear the membrane: this opinion is fortified by the impunity with which the harlequin and tumbler practise every motion, and throw their trunks into every contortion, which the bony fabric will admit; and must lead us to regard with an eye of suspicion, if not to condemn as fabulous, the case of rupture related by GARENGEOT.* The

* A young woman, after throwing her trunk suddenly backwards, felt immediately a considerable pain in the abdomen. GARENGEOT discovered a crural hernia, on which he

hernia of the bladder, as will be explained in the chapter on that subject, differs from other ruptures with respect to its sac. I have never seen any other destitute of a peritoneal covering; but authors of reputation state the following as cases in which no sac exists: viz. Herniæ consequent on penetrating wounds of the abdomen: those which return after an operation; or, where the sac has been destroyed by caustic or other means, with a view to the radical cure. Some add umbilical herniæ: this point will be considered in the chapter on that subject.

The contents of a hernial sac are some part or parts ordinarily contained in the abdomen; and commonly the omentum, or intestines. These are the most moveable viscera; and occupy the front and lower part of the belly: their relative position explains, why, in a mixed case, the latter are covered by the former. The small intestine, from the greater looseness of its connexion, is more frequently protruded than the large; and the ileum more frequently than the jejunum, in consequence of its greater proximity to the ring and crural arch. A part only of the diameter of the tube is sometimes included in a hernia; any larger quantity may descend, from a single

afterwards operated. It contained omentum not covered by any sac. *Operations*, t. 1. p. 373.

fold to the whole moveable portion of the canal. Adipous matter is generally deposited in large quantity in the omentum of fat and elderly persons; and in this state it escapes very readily from the cavity. Protrusions of the large intestine consist, generally, either of the cæcum, or sigmoid flexure of the colon; as these are the least fixed portions of the canal. When the former part descends, it is ordinarily, as we should expect, on the right side; when the latter, on the left. Yet the cæcum and vermiform appendix have been seen in ruptures of the left side:* and, when we consider that the intestines may descend to the knees, dragging even the stomach to the pubes, we shall be convinced that the natural position of an organ cannot, of itself, enable us to determine at which opening it may be protruded.

Other abdominal viscera, besides the intestines and omentum, may be protruded in hernia. The urinary bladder sometimes passes through the abdominal ring. The ovaries† and ute-

* Sandifort, *tabulæ anatomicæ situm viscerum, &c. depingentes.* Expl. of tab. 5 and 6. Camper found the cæcum in an inguinal hernia of the left side, where there was also a hernia on the right side.—*Demonstr. Anat. Pathol.* pt. 2, p. 17.

† Each ovary in an inguinal hernia; Pott's *Works*, v. 3. p. 329. See also Camper, *Rem. Sur le Cancer*; quoted in the French translation of Richter, p. 109, note b. The ovary in

rus,* the spleen† and stomach have been very rarely seen in ruptures.

Section II.

Enumeration of the various species of Ruptures.

A HERNIA generally causes an external tumour, which is named, either according to its situation in the body, or from the parts which it contains. The groin, scrotum, labia pudendi, bend of the thigh, and navel, are the most frequent seats of these swellings; the omentum and intestines, their most common contents.

When the protruded viscera have entered the superior opening of the abdominal ring, and are contained in the canal; or when they have emerged from the canal, through the inferior aperture, in either sex, without passing further than the groin, the case is called a *bubonocele*, or *inguinal hernia*. As this increases in volume in

an ischiatic hernia; CAMPER *Demonst. Anat. Pathol.* lib. 2, p. 17.

* Uterus and left ovary in a large inguinal hernia.—CHOPART & DESSAULT, *Tr. des Mal. Chir.* t. 2. p. 3.

† RUYSCH *Advers.* Dec. 2.

the female, it descends into the labium pudendi, still retaining the same name. In the male the increasing tumour extends into the scrotum, and forms an *oscheocele,* or *scrotal rupture.** If it is formed in the latter sex, before the communication between the peritoneum and the tunica vaginalis testis has been closed, the case is named a *hernia congenita*; because the disposition of parts, from which this peculiarity arises, exists at the time of birth.

The ruptures, which take place at the inferior aperture of the ring, without passing through its canal, and which, appearing first in the groin, and then descending into the scrotum, do not differ in their situation from the above-mentioned inguinal and scrotal herniæ, have not been generally distinguished by any peculiar name. It has been lately proposed to designate these by the appropriate epithet of *ventro-inguinal.*

The rupture, which occurs through the small opening under the pubic extremity of the crural arch, and manifests itself at the bend of the

* While the parts are still in the groin, the hernia has been called *incomplete*; the epithet, *complete,* has been given when they have descended into the scrotum, or labia. The distinction is a bad one, since the rupture, in all its essential characters, is as complete in the former case, as in the latter.

thigh, is called *femoral* or *crural* hernia, or *merocele.**

The *exomphalos, omphalocele,* or *umbilical* hernia takes place through the round opening of the linea alba, which transmits the umbilical blood vessels of the fœtus.

In the cases now enumerated, the viscera pass through natural openings of the parietes; but protrusions may occur at any other part of the abdominal region, and they are then called *ventral* herniæ. They are most frequent in the linea alba; and, when taking place above the navel, have been called *herniæ of the stomach.*

These are by far the most common species; but there are some more rare kinds.

In the *hernia of the perineum,* in either sex, the parts are protruded by the side of the bladder, or vagina. A tumour may be formed in any part of the female vagina, constituting *vaginal* hernia. The *ischiatic* rupture, and that of the *foramen ovale* take place through the respective openings of the pelvis.

The names *enterocele* and *epiplocele,* which are equivalent to *intestinal* and *omental* rupture, are employed according as the swelling contains intestine or omentum alone: where both these

* From μηρος the inside of the thigh, and κηλη.

parts are found in the same tumour, it forms an *entero-epiplocele.*

A protrusion of the urinary bladder constitutes the *cystocele,* or *hernia vesicæ*; that of the stomach, *gastrocele*; of the spleen, *splenocele,* &c. A compound word is sometimes employed, expressing both the situation and contents of the rupture; as *entero-bubonocele, epiplom phalocele,* &c.

So long as the viscera descend and return freely, the complaint is said to be in a *reducible* state. When, after long residence in the tumour, they have either increased so much in bulk, or have contracted such adhesions to each other, or to the hernial sac, as to become incapable of being returned, although they experience no pressure from the ring, it is termed *irreducible.* An incapacity of reduction, arising from pressure exerted by the opening through which the viscera have descended, brings the disease into the *strangulated* or *incarcerated* state: and the part, by which that pressure is caused, is usually called the *stricture.*

CHAPTER II.

CAUSES OF RUPTURES.

THE causes of these complaints may be referred in general to two divisions, according as they appear to operate by increasing the pressure of the viscera, or by diminishing the resistance of the abdominal parietes. The former may be ranked, in a systematic arrangement of the subject, as *occasional* or *exciting*; the latter as *predisposing* causes of the complaint.

Alternate contractions of the diaphragm and abdominal muscles are among the chief agents in the important function of respiration. The containing and contained parts are in a constant state of action and reaction: the latter, particularly the intestines, tending constantly to occupy a larger space, and thereby distending the parietes; while the former, consisting chiefly of muscles, exert a compressive force on the viscera. These powers are ordinarily in equilibrio; and the constant pressure arising from this source maintains the viscera in their relative position; but their balance is destroyed under various circumstances.

A general increase in the contents produces a general yielding of the containing parts, as in ascites, tympanites, or pregnancy: and a similar yielding of all the parietes may occur in a more limited space of the abdomen, constituting a species of ventral rupture. But neither of these cases comes properly under the description of a hernia.

The pressure which the viscera constantly receive from the respiratory muscles, becomes greatly augmented by any unusual exertion, which is always attended with a forcible action of the expiratory and inspiratory powers at the same time. When such efforts are carried beyond a certain point, the parietes of the cavity give way to the impelling force at those parts where they are weakened by the holes for the transmission of blood-vessels; and the viscera are thrust forth from their situation, carrying before them a portion of the peritoneum, which forms the hernial sac. Thus it is that ruptures are frequently produced by the act of lifting or carrying a heavy weight, in running or jumping; in short, under any circumstances where considerable efforts are used. On such occasions the abdominal muscles and diaphragm are called into forcible exertion, for the purpose of fixing the trunk, and affording a steady point of support to the limbs. In the

case of straining, a person is said, in common language, to hold his breath; *i. e.* he first puts the diaphragm in action by a deep inspiration, and then contracts his abdominal muscles. The viscera, compressed by these two forces, escape, wherever an opportunity is allowed, provided their pressure exceeds the resistance offered by the ring, or crural arch. On these principles we can account for the observation concerning the greater frequency of ruptures among the inhabitants of mountainous countries,* with whom opportunities must frequently occur of exerting their strength and activity; as well as for their being more common in the labouring classes of the community.

Other causes, referrible to the same head, arise from the forcible action of the respiratory muscles in the expulsion of the contents of the viscera. Vomiting, straining at stool, and the act of parturition, often produce ruptures. In strictured patients I have seen herniæ formed gradually, in consequence of the habitual efforts required for the evacuation of the bladder. Crying, and the hooping-cough, are frequent sources of the complaint in children.

* Blumenbach has observed this with respect to the Swiss, and to the inhabitants of the Alps in general.

Richter, *Chirurgische Bibliothek*. b. 8.

The protrusion of the bowels, at the ring and crural arch, is favoured by the position of these points, as well as by the comparative weakness of the parietes. The diaphragm and abdominal muscles exert a firm compression above, at the sides, and in front, and thus impel the parts downwards and forwards, against the above mentioned opening. When the upper part of the cavity is subjected to forcible external pressure, as by the application of tight-laced stays, the viscera are driven downwards, and the formation of an inguinal or crural rupture much facilitated. That the consequences of this practice are not imaginary, may be proved by dissection, which shews us an actual change of figure in the lower ribs, and sometimes the obvious marks of external pressure on the surface of the liver.

An observation of the wide space in the skeleton, constituting the inferior aperture of the pelvis, which forms also the lower boundary of the abdominal cavity, would lead us to expect in this situation a frequent seat of herniæ. Position is here particularly favourable to its occurrence; and a forcible impulse is communicated to the hand at this part, whenever a general pressure is exerted on the abdominal viscera. This opening is filled, in the recent subject, by the sacro-sciatic ligaments, and the levatores ani: the latter mus-

cles forming a broad concave surface, which shuts up the front and sides of the pelvis at this part, and which, by replacing the viscera when protruded by the pressure of straining, constitutes an antagonist power to the respiratory muscles. A strong fascia, continued from the arch of the pubes to the prostate and neck of the bladder, prevents protrusions in that situation; and the bladder and rectum afford a considerable obstacle to the formation of ruptures in this neighbourhood. A descent of the viscera through the great sciatic notch, is almost entirely precluded by the space being so occupied by the pyriformis muscle, and the vessels and nerve which go through the opening.

The predisposing cause of ruptures has been referred to a naturally greater size of the openings at which they protrude; to a weakness and relaxation of the margins of these apertures; and to a preternatural laxity of the peritoneum.* The former circumstance has probably a chief operation; since in males, where the abdominal ring

* " Cette foiblesse, cause prèdisposante des hernies, con-
" siste, ou en une laxité contre nature du Péritoine, qui, dans
" les endroits, ou il n'est pas soutenue par les muscles du
" bas-ventre, comme à l'anneau, céde à la distension : ou en
" un relâchement et une extensibilité contre nature du més-
" entère, et de toutes les parties, qui maintiennent les visceres
" du bas-ventre dans leur situation."

RICHTER *Tr. des Hern.* p. 10.

is naturally capacious, inguinal herniæ occur in a very large proportion, while the femoral species is very rare; females on the contrary, having the capacities of these apertures reversed, are seldom affected with inguinal ruptures. Without, however, attempting to decide what is the true reason, it may be safely asserted, that particular subjects manifest an unquestionable disposition to the complaint. In such persons a very slight occasional cause, such as the act of coughing or sneezing, will bring on a rupture; the complaint, indeed, appears sometimes spontaneously. "I know," says RICHTER,* "a savant, "who leads a sedentary life, and in whom "an inguinal hernia appeared suddenly some "time ago. I applied a bandage, and in a few "weeks a similar hernia came on the opposite "side; a bandage was applied to this also; and "in a very short time a crural hernia made its "appearance. I have seen several similar cases; "and have known four or even five herniæ come "in the same subject, without the least occa-"sional cause." The necessity of admitting some original difference of structure favourable to the occurrence of ruptures, is apparent from this consideration, viz, that the openings exist in all subjects, and the occasional causes are applied in all individuals: but the effect is only partial.

* *Traité des Hernies*, p. 9.

When it is stated that hernia has sometimes appeared to be hereditary, the meaning of the observation must be, that there is a certain weakness in the original formation of the parts, predisposing to the complaint, and that this defect may descend to the offspring; and in this sense its truth cannot be disputed.* I believe that the word *hereditary*, in its application to disease, has been always used according to this interpretation; and that the employment of it in its strict sense has only been suggested by those, who wished to shew their ingenuity in refuting an absurdity of their own creation.

The dilatation of the openings, through which herniæ take place, in consequence of the distension of the abdominal parietes during pregnancy, accounts for the greater frequency of ruptures in general, and of the exomphalos in particular, in women who have borne children. The occurrence of umbilical hernia, after dropsy, may be explained on the same ground.

* "On ne peut point nier, que cette cause prédisposante des hernies ne soit héréditaire: je ne prétends pas plus que des péres attaqués des hernies engendrent toujours des enfans, qui seront affectés de cette maladie, que je ne pretends, qu'ils engendrent toujours des enfans, qui leur ressemblent: mais on observe quelquefois l'un et l'autre. J'ai vû des hernies souvenues spontanément et sans aucune cause extérieure à des enfans, dont les pères avoient des hernies."

RICHTER, lib. cit. p. 10.

The ruptures which appear after debilitating diseases, and those which occur in persons, who, from a state of corpulency, become suddenly emaciated, must be referred to weakness.

Penetrating wounds of the abdominal parietes have been considered as strongly predisposing to herniæ. Such cases are not sufficiently common in general practice, to enable me to decide. I do not remember to have seen this effect produced in any instance. RICHERAND observes on this subject, that herniæ seldom fail to occur, however firm the cicatrix may be, unless a bandage be employed as a means of prevention: and that they may be expected with certainty after any considerable bruise, which destroys the powers of resistance (ressort) of the parietes.* He mentions a case in which there was a sabre wound, about an inch in length, in the right hypochondrium, which healed regularly. The patient wore no bandage after his recovery, and at the end of eighteen months there was a hernial swelling, equal in size to two fists. This could be easily replaced and retained.†

* *Nosographie Chirurg.* t. 3, p. 317.

† *Ibid.* p. 319. A case of ventral hernia following the wound made for evacuating an abscess in the abdomen, is mentioned in the first vol. of SCHMUCKER'S *Miscellaneous Writings*, p. 197.

CASE.

A FRIEND of mine met with a remarkable instance of the latter kind in a French emigrant. The danger, anxiety, and fatigue which this unfortunate gentleman experienced in escaping from his native country, and the extreme indigence, to which he found himself reduced on his arrival in England, reduced him from the embonpoint, which the luxurious table of affluence had produced, to a state of considerable emaciation; and a hernia took place at each groin.

We are sometimes unable to determine what is the direct cause of the rupture; as, where it happens in consequence of a blow, from the agitation of a rough cart, or violent horse exercise. The latter circumstance has certainly a decided influence in producing the complaint; for cavalry are found to be ruptured in a much greater proportion than foot soldiers.

It would be useless to make a point of enumerating every trivial circumstance which may occasionally contribute to the formation of a rupture. The general view, which I have already given, will enable the reader to understand the subject sufficiently. I shall just observe, that some of the causes assigned by systematic writers,

are totally inadequate and even ridiculous. In the respectable work of RICHTER, which deserves on the whole much commendation, the origin of herniæ is attributed to the use of relaxing and aqueous liquors, of fat and oily kinds of food; to moisture of the climate, &c. Fish, and even milk, have not escaped the imputation of favouring the formation of these complaints.

Herniæ, which originate in predisposition, generally come on gradually, and almost imperceptibly; while those, which are produced by bodily exertion, are formed suddenly, and by the immediate action of the exciting cause. The occurrence of the complaint is often indicated in the first instance by a fulness, combined with a sense of weakness and uneasiness about the abdominal ring. The swelling is increased by any action of the respiratory muscles, and is therefore rendered more sensible by coughing or holding the breath, and disappears on pressure, and in the recumbent position of the body. It gradually finds its way through the tendon of the external oblique muscle into the groin, and afterwards into the scrotum. When a hernia takes place suddenly, it is generally attended with a sensation of something giving way at the part, and with pain.

CHAPTER III.

SYMPTOMS OF RUPTURES IN THEIR VARIOUS STATES.

Section I.

Symptoms of a reducible Rupture.

WHEN the contents of a rupture experience no pressure from the margins of the opening, through which they have descended, their functions are little, if at all impeded; the description of the disease consists therefore chiefly in an enumeration of the sensible characters of the tumour. When, on the contrary, the hernia is strangulated, the natural offices of the protruded parts are entirely obstructed; hence various dangers and alarming symptoms ensue, by which the character of the complaint is completely changed.

If we meet in any of the usual seats of herniæ, as the groin, scrotum, labia pudendi or navel, with an indolent tumour, either soft, or more tense and elastic, with the colour of the skin not affected, which has arisen under the circumstances

generally attending the formation of this complaint, we naturally ascribe its origin to a protrusion of the abdominal viscera. Our suspicion is converted into certainty, if we find that the swelling varies in size; being smaller in the recumbent position, larger in the erect posture, or when the patient holds his breath; diminishing, or entirely disappearing by means of pressure, and enlarging again when this pressure has ceased; if it be large and tense after a meal, or when the patient is troubled with wind, soft and small in the morning, before he has taken any food: if, since the commencement of the complaint, he have been troubled with any affections, arising from the unnatural situation of the viscera, as colic, constipation or vomiting; if he perceive occasionally a rumbling sensation in the tumour, particularly on its return; and lastly, if it become tense when he coughs, so that an impulse is communicated to the hand of the examiner.

These, which may be called the general symptoms of hernia, are not all observable in every species and state of the complaint: each kind has its particular signs, as I shall explain hereafter. But, in most instances, the circumstances which have preceded or accompanied its origin, and the affections, which have followed its appearance, will enable the surgeon to determine the nature of the tumour.

The symptoms of the case will sometimes in-

form us what are the contained parts. This discrimination, indeed, is often difficult, and even impossible, when the hernia is old, large, and very tense. For the viscera in such ruptures experience considerable changes in their figure and state, while the thickened hernial sac prevents an accurate examination by the hand. Again, it is frequently hard to determine the contents of a very small hernia.

If the surface of the tumour be uniform; if it be elastic to the touch; if it become tense and enlarged when the patient is troubled with wind, holds his breath, or coughs; if, in the latter case, the tumour feel as if it were inflated; if the part return with a peculiar noise, and pass through the opening at once, the contents of the swelling are intestine. If the tumour be compressible; if it feel flabby, and uneven on the surface; if it be free from tension, under the circumstances just enumerated; if it return without any noise, and pass up very gradually, the case may be considered an epiplocele.

The smooth and slippery surface of the intestine makes its reduction easier; and the mixture of air with the intestinal contents, causes, when they are pressed up, a peculiar guggling noise, (Gargouillement of the French). The reduction of the omentum is more difficult, since it is soft and uneven, and its surface becomes moulded by the surrounding parts. If a portion of the

contents slip up quickly, and with noise, leaving behind something which is less easily reduced, the case is probably an entero-epiplocele.

The circumstances above enumerated do not enable us to determine, in all cases, what are the contents of a rupture. PETIT, after stating, with the candour characteristic of true science, that he has been frequently mistaken in his opinion, delivers the following very sensible observations, which it will be well for the young practitioner to bear in mind on other occasions, as well as the present:

"Let young surgeons acquire a habit of "caution from what I now say; let them reflect "before they speak or act, and remember that "there is often a great difference between what "a person really sees, and what he fancies that "he sees. Speaking too hastily may be followed "by bitter regret; but we very seldom repent "of having been silent. Those who run after "reputation do not always overtake it; the "merit on which it is founded, is like fruit "which ought not to be gathered, until it has "attained maturity."*

"I have experienced what I say more than "once, and doubt not that others have met with "similar occurrences. From having been de-

* *Tr. des Malad. Chirurg.* t. 2. p. 311.

" ceived in my judgment, I am no longer so ready " to offer a prognosis; for, by the confession of " the greatest practitioners, few herniæ resemble " each other exactly. Those who have not seen " much, will not be disposed to believe what I " say; they will imagine that nothing more is " required, in order to determine the nature of a " rupture, than to know what authors state con- " cerning the signs which indicate the presence " of intestine or omentum; but they deceive " themselves."*

The circumstances which have been just enumerated, characterize the complaint so perfectly, that no doubt can exist as to its nature; there can be no fear of confounding it with other disorders, if we advert to their origin, progress, and symptoms. The nature of the case is more doubtful, if the swelling be small and deeply seated; if it has arisen gradually; if it be connected with other tumours; if it contain much fluid, and the patient be fat. Here the greatest attention and discernment are required on the part of the surgeon; his opinion must be guided rather by the symptoms, than by the characters of the tumour.

A reducible hernia, though attended with no immediate danger, occasions much trouble to the patient, particularly if it be allowed to proceed unrestrained by surgical treatment: and

* *Tr. des. Malad. Chirurg.* p. 308.

the inconvenience increases constantly with the size of the tumour. The portion of intestine or omentum, which has left the abdomen, produces various complaints from its connexion with the parts within. From this source of irritation proceed nausea and vomiting, indigestion, and colic. As the viscera become accustomed to their unnatural situation, these symptoms gradually wear away. Still, as the tumour constantly increases in size, a large part of the viscera is deprived of that pressure and support, which it naturally derives from the respiratory muscles; the passage of the food through the alimentary canal becomes difficult and protracted; and hence large ruptures are almost invariably attended with flatulence and constipation. The patient is precluded from all active and laborious employments, and from all considerable exertions, which necessarily augment the tumour, and are attended with great risk of more immediate danger, by forcing down fresh parts, so as to cause strangulation. The opening, through which the viscera pass out, must subject them to more or less pressure; which will enable us to account for that effusion of fluid into the cavity of the sac, which is generally observed in old ruptures; and for the formation of those adhesions of the parts to each other, and to the hernial sac, which change the case from a

reducible swelling, to one which will no longer admit of reduction. Since the opening becomes enlarged by the protruded parts, and the pressure on the viscera, which causes the descent, is frequently renewed, additions to the tumour take place very readily. In situations, where position is favourable, and the surrounding parts offer no obstacle, as in the scrotum, the only limit to the possible bulk of a rupture arises from the connexions of the parts within. Instances are not uncommon where all the moveable viscera have been contained in such a swelling; and even those, which are more fixed, may be gradually displaced by the constant dragging of organs connected with them.

Section II,

Symptoms of a strangulated Rupture.

The first and most immediate effects of such a degree of pressure, as prevents the return of the protruded parts, are an obstruction to the passage of the intestinal contents, and consequent want of fecal evacuations; and a more or less violent inflammation in the strangulated part. The former symptom may not be so clearly mark-

ed, where a part only of the diameter of the gut is strangulated, but it will often occur to as great a degree in that case, and will be equally insuperable by purgative medicines,* as where a complete fold of intestine is included: it even happens occasionally in a mere epiplocele, where no intestine at all is protruded. Hence it must be referred rather to that inflammatory affection of the intestines, which subsists in this complaint, than to the mechanical obstruction of the canal; and must be considered as analogous to the constipation, which prevails in ileus when produced by other causes. The action of a clyster on the bowels below the stricture often produces a stool after the strangulation has taken place. But when these have been once emptied, the most irritating clysters produce no effect. The inflam-

* Morgagni mentions a case, in which a part only of the diameter was included, where the stools were not suppressed; yet it ended fatally; *De Causis et sed.* Ep. 34, Art. 15. Many instances are recorded in which the constipation has been complete. *Memoires de l'Academie de Chirurgie*, tom. III. p. 151. *London Med. Obs. and Enquiries*, vol. IV. p. 178 and 355. *Philosophical Magazine*, vol. 31. p. 214, et seq.
De Haen *Ratio Medendi*, p. 2, c. 4.

A patient of Morgagni's died on the sixth day, after constipation continuing for the whole time: the entire diameter of the intestine here was unobstructed, the protruded part being merely a diverticulum.—Ep. 34. Art. 18. He quotes a similar case from Benevoli *Due Relazioni Chirurg.* Art. 19.

mation of the protruded viscera causes a thickening of their coats, an effusion of fluid into the hernial sac, and adhesions of the parts to each other, and to the containing bag. When it is particularly violent, a layer of coagulating lymph is sometimes thrown out on the surface of the intestine. A manifest impression is often made on the intestine by the stricture, and this may proceed so far as to cause a considerable constriction of the canal.* It terminates at last, unless the stricture be previously removed, in gangrene. These, which we may call the *primary* effects of the incarceration, are accompanied by other symptoms, arising from disorder of the parts, which sympathise with the hernia.

In an incarcerated intestinal rupture, the tumour, which was before indolent, becomes painful; the pain is most acute at the strictured portion, and extends from that situation over the rest of the swelling and abdomen; these parts becoming at the same time swoln and tense. A

* In a patient, who died with insuperable constipation, and all the symptoms of ileus, I found the small intestine surrounded at one point by a preternatural adhesion, consisting of a firm and roundish cord. The canal was here permanently contracted, so as not to exceed a large quill in diameter. Mr. RITSCH found it completely closed, in a case of hernia. *Mem. de l'Acad. de Chirurg.* t. 4. *Sur un Effet peu connu de l'etranglement dans la hernie intestinale.* See also MONRO on *Crural Hernia*, p. 17, and pl. 5, fig. 2.

feeling of tightness, as if from a cord drawn across the upper part of the belly, is often one of the earliest symptoms of strangulation. The pain, which at first is not constant, becomes in the sequel fixed; and is augmented by external pressure, coughing, sneezing, or other agitations of the body. The evacuations *per anum* are entirely suppressed, and nausea and vomiting ensue; all the contents of the stomach, and afterwards those of the intestine, down to the stricture, being rejected.* These symptoms, which often remit for a considerable period, are accompanied by a proportionate derangement of the whole system. There is great anxiety and restlessness, with a small quick and hard pulse, and coldness of the extremities. The pulse cannot be at all depended on, as indicating the degree of general

* This constitutes what is termed *stercoraceous* vomiting; it consists, probably, in general, of the contents of the small intestine. A consideration of the valvula coli would induce us to suppose that the contents of the large intestine could not pass into the small: but repeated observation has shewn, that this valve does not offer an insuperable obstacle. "Probatissimi auctores hoc observarunt, et ipse manifesté vidi;" says HALLER.

HEBERDEN has seen clysters vomited up in a case of hernia; and adds, that he has frequently witnessed it in ileus. *Medical Transactions*, v. II. p. 514. The testimony of DE HAEN may also be quoted. *Rat. Med.* pt. 2, c. 5.

fever. It may be even slower than in health, when the patient is in the greatest danger. Neither does the degree of heat, as ascertained by our examination, or indicated by the patient's sensations, correspond to that of fevers in general: on the contrary, there is a disposition to cold sweats, and cold state of the extremities. After a time hiccough supervenes, the pulse becomes so small as to be hardly sensible, the respiration is weak, and the whole body is covered by a cold and clammy sweat. Mortification now takes place; it begins in the contents of the rupture and extends to the containing and neighbouring parts. The degree and intensity of the symptoms are modified by various circumstances, as the age and strength of the patient, the nature of the strangulation, &c. The duration of the complaint, from its first commencement, to the termination in mortification or death, is also extremely various.

An epiplocele is much less liable to strangulation, than an intestinal rupture, and its symptoms are milder and slower in their progress. In this variety of the complaint, stools may generally be procured by purgative medicines or clysters. The connexion of the omentum with the stomach induces hiccough and sickness, and although the latter symptom seldom proceeds to stercoraceous vomiting, it exists to a most distressing degree, and particularly characterizes the

complaint. The symptoms are often influenced by the position of the body, being mitigated by bending, and aggravated by straightening the trunk. An epiplocele is occasionally accompanied with all the dangerous and alarming symptoms of an intestinal rupture, as insuperable constipation, fecal vomiting, &c.

The examination of a patient who dies while labouring under a strangulated hernia, discloses such a state of parts as the symptoms just enumerated would naturally lead us to expect. The whole surface of the peritoneum is inflamed, and the intestines participate in this disorder, particularly that portion of the canal, which is above the stricture, which is distended considerably beyond its natural diameter. From the constricted part downwards, the intestine is generally smaller than usual, and not inflamed. The convolutions of the intestinal canal are agglutinated by a recent deposition of coagulating lymph; and a turbid puriform fluid, with coagulated flakes, is effused into the abdomen; streaks of a bright red colour, consisting of an aggregation of minute vessels, cross the intestines in different directions; and spots of gangrene are not unfrequently observed. All these circumstances shew us most decidedly that the effects caused by strangulation are of the most active inflammatory kind. We must regard the stricture, which the

protruded parts experience, as the immediate cause of this disorder.

The distinction of strangulation, from affections which may resemble it more or less nearly, requires considerable attention and judgment. The intestine included in a large hernia may be affected with colic, and thus give rise to constipation and vomiting. This may be the more easily mistaken for strangulation, if the parts are adherent, and incapable of reduction. Such an attack may render a reducible hernia incapable of being replaced; particularly if the bowels are much inflated. Clysters and oily purgatives will produce stools under these circumstances, and thereby throw light on the real nature of the case.

The first appearance of a rupture may occasion hiccough, vomiting, and pain; and the same symptoms may be exhibited in an old case, after the patient has taken much exercise, or remained long in the erect posture, in consequence of irritation excited by the protruded viscera in the contents of the abdomen. Here too stools may be easily procured by purgatives.

The most important case, however, is, where a patient with a rupture has an attack of ileus from some other cause, in which the original complaint is not at all concerned. The operation, performed on the supposition that the symp-

toms arise from the hernia, would here be not only useless, but even injurious; and the surgeon would neglect those means which the inflammation of the bowels so urgently demands.

Whenever we see a patient labouring under the symptoms of ileus, we should suspect the existence of a rupture, and make those inquiries and examinations, which such a suspicion would naturally suggest, particularly in females, who are often led to concealment by motives of false delicacy. A superficial examination is not sufficient on these occasions; as a very small portion of intestine, not forming any external tumour, may, by its incarceration, cause the symptoms. If the latter have appeared suddenly, and under circumstances which might cause a rupture; if the pain have been first felt about the ring or crural arch, and if pressure in these situations increase it; and, lastly, if the patient, shortly before, had been in perfect health, there is strong reason to suspect the existence of a hernia.

When a person labouring under ileus has a hernia, which can be reduced easily, there is no ground for doubt; if, on the contrary, the parts cannot be replaced, strangulation may be reasonably suspected, although we cannot immediately conclude, with certainty, that the swelling is the cause of the inflammation. We should first

ascertain whether the parts could be replaced previously to the attack; if they could not, and the swelling be large and old, they are probably adherent; and the impossibility of reduction proves nothing. If they could be returned, and particularly a short time only before the access of the symptoms, strangulation may be suspected with justice; but it is still not quite certain. The two following cases, related by Mr. Pott,* shew the possibility of mistake, and will forcibly inculcate the necessity of a minute attention to the circumstances.

CASE I.

"An old gentleman, who had for many years had an irreturnable rupture of the mixed kind, and which I had often seen, was seized with the symptoms of an obstruction in the intestinal canal.

He complained of great pain in his whole belly, but particularly about his navel; he was hot and restless, and had a frequent inclination to vomit; his pulse was full, hard, and frequent; and he had gone, contrary to his usual custom, three days without a stool.

* *Works*, vol. 3, p. 304, and 307; edition of 1783.

I examined his rupture very carefully; the process was large and full, as usual, but not at all tense or painful upon being handled; his belly was much swollen and hard, and he could hardly bear the light pressure of a hand about his navel. Upon mature consideration of the whole, I was of opinion, that his rupture had no share in his present complaints. But as some of his symptoms resembled those of a stricture, I desired that more advice might be had. A physician and surgeon were called: I gave them an account of what I had seen of the case, of my opinion concerning the irreducibility of the rupture, and that it had no share in the present complaint; at the same time desiring my colleague to examine for himself. We tried at reduction without success; but he thought that there was still a stricture. The Doctor ordered bleeding, clysters, and cathartics: the last were immediately rejected by vomit, and the clyster came away without any mixture of fæces. Bleeding was repeated ad deliquium, the tobacco smoke was injected, but all to no purpose. The operation was proposed, but as the case did not appear to me to require it, I could not second the motion; it was, however, mentioned to the patient, who would not consent, unless I would say that I thought it necessary, and believed it would be successful: I could not say either, because I be-

lieved neither. Every thing else that art could suggest or practise, was tried; but on the sixth day he died.

As it had been supposed that I was wrong and positive, I was very glad that his friends chose to have him opened.

The hernial sac was thick and hard, and contained a large portion of omentum, a piece of the ileum, and a portion of the colon, all perfectly sound, free from inflammation or stricture, and irreturnable only from quantity. But the intestine jejunum was greatly distended, highly inflamed, and, in some parts, sphacelated."

CASE II.

" JOHN DEWELL, a man about thirty, was brought into St. Bartholomew's, labouring, as was supposed, under an incarcerated hernia. He had not had a stool for three days, although he had taken both purges and clysters; he vomited almost incessantly, his pulse was hard and frequent, but not full, and his countenance bespoke death.

He had a rupture; it was on the right side, was clearly intestinal, was soft, easy, occasioned no pain upon being handled, and seemed to be capable of reduction; but, after many trials, I found that I could not accomplish that end, notwithstanding

I used my utmost endeavours; all which gave the man no uneasiness, and therefore satisfied me, that his symptoms did not arise from his hernia, which was also the patient's own opinion.

Mr. Nourse coming into the ward, I desired him to look at the man: he thought that, notwithstanding the seemingly quiet state of the rupture, a small portion of gut might be so engaged, as to cause his present mischief, and therefore that the operation was warrantable and proper.

Supposing it to be right at all, it could not be done too soon, and therefore we set about it immediately.

The hernial sac was formed by the tunica vaginalis; it contained a portion of intestine ileum, which had contracted a slight cohesion with the testicle, but was so perfectly free from stricture, that, when we had loosened it from its connexion, we returned it into the belly without dividing the tendon.

I was indeed afraid that the man would have died before we could have got him to bed, but he lived till the next day.

A portion of the colon within the belly had been in a state of inflammation, was now plainly mortified, and quite black."

The following circumstances will enable the

practitioner to decide, in similar cases, that the symptoms are not produced by the hernia; that it is not strangulated; and that the ileus arises from an internal cause. The pain is felt in the abdomen, and not in the swelling, which continues soft, while the belly is inflated, hard, and tense. The attack is sudden, and not preceded by any of the occasional causes, which could affect the rupture; and the ring is free. The affection extends in the sequel to the swelling, which then becomes painful and tense: but it appears later here than in the belly, and does not proceed to so great a degree.

The most embarrassing case of all, is, where inflammation attacks the protruded parts, but is entirely independent of the rupture. The occurrence is rare, but very possible; since the intestines included in a hernia are exposed to the same causes of disease as in their natural situation. It may be expected to happen principally in large herniæ: the swelling is the seat, and not the cause of the disease. The distinction must be very difficult. The want of tension, and of pain at the ring, while the swelling itself was painful; and the previous attack of feverish rigour might lead us to suspect inflammation of the protruded intestine. If the ring afterwards became tense, and the included parts considerably painful, we should conclude that strangulation had supervened, and act accordingly.

CHAPTER IV.

CAUSES, AND DIFFERENT SPECIES OF STRANGULATION; AND PROGNOSIS OF STRANGULATED HERNIA.

SECTION I.

Causes of Strangulation.

THAT the symptoms of strangulated hernia arise from the pressure of the stricture on the protruded parts; and that this cause is not only adequate to that effect, but, indeed, the only one that can be assigned, is too clear to admit of any doubt. Systematic writers have distinguished the causes of incarceration, as consisting either in a diminished capacity of the opening, or in the intrusion of additional parts into the aperture. This distinction would not be a very important one, if it were well founded, since the presence of either of these circumstances must imply relatively that of the other. I believe, however, that the former can hardly be admitted as a cause of strangulation. The

openings through which herniæ generally protrude, being tendinous, cannot contract, or diminish in capacity: hence the term *stricture*, equivalent to contraction or narrowing, is objectionable. The parts are increased in bulk, and the ring feels tense, hence it is found to be actually *dilated*; larger indeed than in health. The term stricture, has led to erroneous practice, to the use of emollients, and such topical remedies as are supposed to possess the power of relaxing stricture; whereas we should attempt to reduce the bulk of the parts. The tendinous openings then, through which herniæ generally protrude, cannot, by their nature, undergo much change; and particularly do not admit of contraction. The protruded parts, however, are capable of considerable enlargement; and the tendons can produce passively as complete a constrictive effect, as if they had possessed the most unequivocal powers of active contraction. A portion of intestine, or omentum, pushed suddenly by a violent effort through the abdominal ring, may be immediately strangulated. A piece of bowel forced down in an omental rupture, a new portion protruded in an old intestinal hernia, or the distension of the contained intestine by its contents, whether of food or air, will so fill up the ring, as to produce incarceration. In all these cases the symptoms cease immediately on

reduction, or on the division of the ring, which proves clearly the nature of the cause.

The cause of stricture may exist in the mouth of the hernial sac, as well as in the tendinous aperture; the protruded parts may be compressed by both, or by one only of these. The peritoneum, which, in its natural state, is soft, thin, and yielding, is sometimes thickened by the pressure it undergoes in a hernia. When this is considerable, the mouth of the sac is converted into a kind of callous ring. The pressure of a truss may probably assist in this process, and the effect is augmented by the surrounding cellular substance undergoing the same process. In this way the part occasionally acquires a kind of cartilaginous* hardness, fully adequate to cause effectual compression on the protruded viscera.

I am the more desirous to state my opinion clearly on this matter, as I had expressed a doubt in the last edition of this work, whether the neck of the sac could produce stricture. The opportunities of dissection, which I have since met with, have convinced me of the affirmative.

It is less common to find the cause of stricture in the hernial sac, at some part exterior to the ring. Yet such cases are occasionally seen.

* Arnaud found the neck of the sac "entierement cartilagineux, epais de trois lignes."—*Tr. des Hern.* t. 2, p. 11.

Instances of this kind are mentioned in the chapter on hernia congenita. I lately met with a large and old entero-epiplocele, towards the bottom of which was a round opening, with a thick and hard margin, leading into an inferior division of the sac. The omentum had passed through this, and become firmly adherent to the lower part; and an intestine might have been easily strangulated in the aperture.

It must generally be impossible to determine the seat of stricture, previously to an operation: and no practical advantage could be derived from ascertaining this point. We may observe, however, that when a hernia is incarcerated at the moment of its formation, there can be no doubt that the pressure is made by the border of the tendinous aperture; and if the patient has never worn a truss, the same observation will probably hold good. When, however, an old rupture, which has been long retained by a truss, is again protruded, and strangulated, the neck of the sac may probably be the cause, in consequence of its becoming thickened and contracted by the pressure. And hence arises the danger which a patient incurs by neglecting the use of a truss, after having worn it for some time.

Some other rare kinds of strangulation have been noticed by surgical authors. It has been produced by preternatural adhesions of the parts;

by a fissure in the omentum*; by the pressure of the part in a hardened state; by various foreign bodies, which had been previously swallowed†; by worms, &c. None of these causes can be ascertained previously to an operation, or to the patient's death, and are, therefore, of no practical importance.

Section II.

Different Species of Strangulation.

An important distinction arises from the nature and general symptoms of the case; in compliance with which, we discriminate between the acute or inflammatory, and the chronic or slow kinds of strangulation. This indeed is highly useful, as it comprehends the characteristic marks of two very different cases, and leads to practical discrimination in their treatment.

The inflammatory strangulation occurs in

* *Acta Havniensia*, vol. I. Arnaud *Mem. de Chir.* vol. II. p. 569, 574, 587, 590.

† Richter, *Tr. des Hernies*, p. 47. Morand, *Opuscules de Chirurgie*, pt. 2, p. 165. *Acad. des Sciences*, 1728, p. 41.

young and strong patients; in cases, where a rupture is formed suddenly by a great bodily exertion; or where, after having been kept up by a truss for a long time, it is suddenly reproduced by any cause of the same description. It is mostly confined to small herniæ, or to such at least as are of a moderate size. Under the circumstances just enumerated, the opening through which the viscera protrude, is small: the pressure on the protruded parts must consequently be great; and hence, in great measure, arises the peculiar character of the case. The symptoms come on suddenly, and their progress is rapid; the swelling is tense and highly painful, particularly at the ring, where the slightest pressure is intolerable; the abdomen quickly becomes painful, and is tense and elastic to the feel: the constitutional affection partakes of the inflammatory character. So quickly does the complaint run through its stages in this case, that gangrene has been known to occur in twenty-four * hours from the expulsion of the intestine.

* Wilmer's *Practical Observations on Herniæ*, p. 74.—Pott's *Treatise on Ruptures*, in his works, vol. 2, p. 94, edition of 1783. The latter writer mentions another instance, in which a bubonocele terminated fatally in less than a day, (ibid. p. 85.) Mr. Hey has twice seen patients die of hernia within twenty-four hours.—(*Practical Observations*, p. 142.) In a case alluded to by Mr. Cooper, eight hours

The slow strangulation takes place in large and old herniæ, which have been often protruded and replaced, or which have been long unreduced. The contained intestines, removed from their natural situation, and no longer supported by the pressure of the respiratory muscles, are probably rendered somewhat indolent in performing their functions; as patients of this kind are habitually subject to costiveness and intestinal complaints. The contents of the alimentary canal will easily be retained in a situation where they enter the intestine without difficulty, but have their egress obstructed by the force of gravity. The entrance of indigested food, of worms, or of a foreign body, into such a tumour, would be very likely to cause irritation and obstruction, and a consequent accumulation of the intestinal contents. The strangulation arising from such an accumulation constitutes the case, which has been

only elapsed between the occurrence of strangulation and the patient's death.—(*Anatomy and Surgical Treatment of Inguinal and Congenital Herniæ*, p. 26.) The same author also gives an instance of umbilical hernia, in which the progress to a fatal termination was remarkably rapid. The symptoms were of the most acute and violent description: death happened in seventeen hours and a half after strangulation began; and the integuments had already mortified at one part of the swelling. (*Anatomy and Surgical Treatment of Crural and Umbilical Hernia*, p. 45.)

termed by a French writer* "hernie par engouement des matières." The rupture swells slowly, and becomes heavy and hard. The patient is constipated. The abdomen enlarges from the accumulation of the intestinal contents above the stricture. After some days the swelling becomes painful, and the patient grows feverish: but the fever is not considerable, neither are the abdomen or tumor ever so painful and tense, as in the former species of incarceration. In some cases of this description, a fortnight has elapsed without any considerable morbid alteration having taken place in the protruded parts. LE DRAN† operated on the sixteenth day without finding the contents of the swelling much altered from their natural appearance; and SAVIARD‡ did the operation with complete success on the twenty-second day from the commencement of the incarceration.

The unusual heaviness and hardness of the tumour, the constipation preceding the pain, and the slow origin and progress of the symptoms, are the peculiar characters of this strangulation. The

* See a Memoir of Mr. GOURSAUD, "sur la différence des causes de l'étranglement des hernies," in the *Mémoires de l'Acad. de Chir.* tom. 4.

† *Observations de Chirurgie*—Obs. 57.

‡ *Nouveau Recueil d'Obs. Chirurg.* Obs. 20, p. 112.

indication is to unload the intestine. The inflammation, which occurs in the sequel, is a secondary symptom.

The differences observable in the two very opposite cases which I have just described, admit of an easy explanation. In the first, the close pressure of the ring on the prolapsed parts, in a subject prone to inflammation, causes immediately a violent inflammatory derangement of the abdominal viscera. The accumulation of feces, on the other hand, where the parts and the constitution are in a torpid condition, gives to the disorder the character of a merely mechanical obstruction.

As the description is drawn from the most strongly marked cases, we shall seldom find the difference between the two kinds of strangulation so clearly expressed. The symptoms indeed are often of such a mixed and indefinite nature, that they might be arranged without impropriety under either of the above species.

To the two kinds of strangulation, which I have now described, RICHTER has added a third, under the epithet of *spasmodic*, which he considers to arise from the action of the external oblique muscle. It does not seem to me that this case is sufficiently characterised, nor that any practical benefit can be derived from the distinction. The following passage will shew what

symptoms this author considers as peculiarly denoting the existence of spasm:—

"La respiration courte et froide, le ventre "tendu, gonflé, et cependant peu douleureux, le "froid, et la pâleur de la mort, qu'on remarque "au visage, aux extrémités; l'anxiété, l'agita- "tion, le vomissement, le hocquet, le pouls petit "et serré ne sont ils pas des preuves manifestes "d'une maladie spasmodique? et ces symptomes "paroissent souvent dans les premiers momens "de l'étranglement."*

If these are the symptoms of a spasmodic stricture, every rupture which happens may be classed under this description.

Richter considers further that the remissions and exacerbations observable in some cases, the benefit derived from opium, warm-bathing, and other means of the antispasmodic kind, the cases in which examination after death has discovered no signs of inflammation in the protruded parts, and the absence of the circumstances characterising the other species of incarceration are strong arguments for the spasmodic nature of the symptoms. He admits that inflammation will ultimately supervene; and consequently, that those cases, which might at first have been relieved merely by antispasmodics, require, in a later stage, the

* *Traité des Hernies*, p. 53.

antiphlogistic treatment. It appears that the remarks of this excellent surgeon refer rather to a particular stage of the complaint, or to the characters which it assumes in particular constitutions, than to any essential distinction in the nature of the affection. We shall allow, without difficulty, that the first symptoms of strangulation do not proceed from actual inflammation of the bowels; but from irritation affecting these organs: since the replacement of the rupture will produce instant relief. It may be expected too, that in certain irritable constitutions, this character of the symptoms will be more obvious. Opium will undoubtedly appease the symptoms, and procure a temporary relief; but the cause still remains; and the progress of the case will speedily exhibit inflammation. I do not therefore see a sufficient ground for establishing this distinction, and I think it might even prove injurious by encouraging an inert treatment in an affection where delay is highly dangerous.

Section III.

Prognosis of strangulated Hernia.

In a case of strangulated hernia, our prognosis will be influenced by the cause of the rup-

ture, by the nature of the incarceration, by the size, situation, and contents of the swelling, and by the age and constitution of the patient.

The pressure on the prolapsed parts will be in proportion to the narrowness and elasticity of the tendinous opening: the progress of the symptoms, the urgency of the danger, and the necessity for employing means of relief, will be increased in the same ratio. The slowness of the case will be according to the largeness of the opening and the weakness of its margins.

A large and old rupture, which seems most formidable on the first view, is in reality attended with much less danger than a small and recent one; and it is more difficult to effect the replacement of a rupture of the latter than of the former description.

"I think (says Mr. HEY), it is not a bad general rule, that the smaller the hernia, the less "hope there is of reducing it by the taxis. Long "continued efforts to reduce a prolapsed intestine are most likely to succeed in old and large "hernias, when no adhesion had taken place."*

An old rupture is not readily strangulated, and when it falls into this state the danger is not imminent; the distention of the opening, previous to incarceration, has so dilated and weakened

* *Practical Obs.* p. 203.

the parts, that they can no longer produce a close constriction. In a small and recent case, the dimensions of the aperture are unimpaired, and its sides are unyielding: strangulation takes place easily, and the degree of stricture is always considerable.

The danger is greatest, when a rupture is incarcerated at the moment of its formation. Herniæ, which arise spontaneously, and, as it seems, merely from predisposing weakness, seldom become strangulated: the stricture, in such cases, is never close, nor are the symptoms violent, because the parts concerned are weak and relaxed.

The opening, through which the parts protrude, is narrower in some situations than in others; the progress of the case will therefore be more rapid, and the danger of the patient more urgent. The aperture is generally very small in femoral hernia: this kind of rupture in men, and the bubonocele in women, have a particularly narrow entrance. On the same grounds femoral, inguinal, and umbilical ruptures are more dangerous than the ventral, perineal, or vaginal kinds.

An enterocele is much more hazardous to the patient than an omental rupture; for the parts are more sensible, and the due performance of their functions is more essential to the support of life.

The incarceration of a small portion of intestine is the most dangerous, because the opening is narrow and presses closely, while the whole effect of the pressure is felt by the undefended gut; consequently inflammation appears speedily. When the quantity of intestine is greater the ring must be more open, and there is a portion of mesentery to partake of the pressure. The omentum protects the intestine more or less in an entero-epiplocele. An incarcerated epiplocele is the least dangerous, and, indeed, is seldom fatal. The sensibility of the omentum is not considerable in the natural state; it can bear much pressure without inconvenience; and it does not ordinarily excite very alarming symptoms when inflamed.

In persons of a robust constitution, and of the adult period of life, the symptoms will partake of the inflammatory character; the ruptures of old subjects are generally of long standing, which, together with the diminished powers of their system, bestows on the complaint a more languid form. It assumes the same appearance in individuals of a weak frame. The herniæ of very young subjects are attended with less danger than of those at a more advanced age, from their organs being more yielding, and because they are less susceptible of acute inflammation. Yet, although they are very rarely strangulated, they

are not entirely exempt from this occurrence. Mr. Pott* saw a child of one year old die of incarcerated rupture. Gooch† has recorded an instance, which proceeded even to mortification in an infant of ten weeks; and one of six months perished from strangulation, in the hospital at Leyden.‡

CASE.

I lately witnessed a successful operation for scrotal hernia, at St Bartholomew's hospital, in a child fourteen months of age. This case, which was under the care of Mr. Long, afforded an exception to the general rule mentioned by Mr. Pott§, "that all those ruptures, which appear "in the scrotum of very young children are con-

* *Works*, vol. 2, p. 33.

† *Surgery*, vol. 2, p. 203. It appears that this case must have suffered strangulation for twenty days before the gut gave way: but at first the feces were not entirely suppressed. They were afterwards discharged through two openings, which soon healed, and a complete recovery followed. Probably the cæcum had been protruded: but it is not stated on which side the complaint was situated.

‡ Gerard Sandifort, *Tabulæ Anatomicæ:* see *Edinb. Journal*, vol. 3, p. 470.

§ *Works*, vol. 2, p. 23. Note.

" genial." The parts had descended to the bottom of the scrotum, but were not contained in the tunica vaginalis testis. All the usual means of reduction had been attempted ineffectually, before the operation was resorted to; the contents of the tumour consisted of a portion of large intestine; the sac was very thin, and, though adherent to the surrounding parts, mistaken at first, as it frequently is, for the intestine: the great closeness of the stricture rendered the division of the tendon a matter of some difficulty. The crying of the child forced the gut frequently through the wound, in the progress of the cure: but the parts, being supported by sticking plaister, gradually healed. The rupture descended again in a short time.

CHAP. V.

TREATMENT OF REDUCIBLE RUPTURES.

THE treatment of a reducible rupture comprehends the return of the protruded parts, and their retention within the abdominal cavity by means of an appropriate truss. The necessary observations concerning the mode of replacing ruptures will be delivered when the treatment of strangulated hernia is considered.

So long as the protruded viscera can be made to pass freely into the abdomen, this complaint carries with it no immediate danger to the patient. It may indeed be troublesome, both from the bulk of the swelling, and from the intestinal derangements, which the residence of the viscera in their unnatural situation is apt to create; but, independently of these circumstances, it may exist throughout life, without causing more than slight inconvenience. This innocent state of the disorder cannot, however, be at all depended on; as numerous accidental causes may at any time bring it into a condition, where the life of the patient is exposed to the greatest risk. A trifling

bodily exertion, by forcing down an additional quantity of the bowels, an excess in eating or drinking, an indigestion or any intestinal disorder may convert the rupture from a reducible to an incarcerated state. Should the patient escape this fate, the unrestrained increase of the swelling constitutes a sure source of future inconvenience and disease. The vast size, to which neglected herniæ sometimes increase, not only prohibits all active exertion; but, by involving, in the male, the integuments of the penis, incapacitates the subject from the act of copulation, and gives rise to excoriation from the discharge of the urine over the swelling. Probably too the testis may be affected by the pressure of a very large scrotal hernia.* Disorders of the intestinal functions invariably attend these large ruptures, and increase in frequency and violence in proportion to the size of the swelling, and age of the patient. All the moveable viscera of the abdomen gradually find their way into the hernial sac, if a rupture be entirely neglected. Numerous instances are recorded, in which the jejunum, ileum, colon, and omentum have been entirely included. The constant force acts even upon the more fixed parts, and entirely changes their relative posi-

* Morgagni *de Caus. et sed.* Ep. 43, Art. 12. Schmucker *Vermischte Chir. Schriften*, b. 3. p. 195.

tions; thus the stomach is brought into a perpendicular line parallel to the axis of the body; and its pyloric orifice has been actually within the mouth of the sac. It was drawn down to the pubes in the case of Mr. GIBBON.*

These considerations should render every person, afflicted with a rupture, anxious to get the parts replaced, and to have a proper truss applied; and they should lead surgeons to inculcate the necessity of these measures, as forcibly as they can, on the minds of all such as seek relief from their advice.

Construction and Use of Trusses.

Our object, in the application of a truss, is to close the opening, through which the viscera protrude, by means of external pressure; and thereby, after the parts have been reduced, to prevent a second descent. The instruments employed for this purpose have been brought to great perfection in the course of the last century; and, when we consider the great number of ruptured persons, together with the essential relief

* *Miscellaneous Works*, by Ld. SHEFFIELD, 1. 299. See also MERY in the *Acad. des Sc.* 1701. CARLISLE in *Phil. Trans.* 1766. No. 18.

which they derive from these bandages, we shall not fail to regard them as the most useful production of modern surgery.

A well contrived bandage should exert a sufficient and uniform pressure, without incommoding the patient, or being easily susceptible of derangement.

The different kinds of herniary bandages may be reduced to the two classes of elastic and non-elastic. The latter are composed of leather, fustian, dimity, or similar materials. These cannot be at all depended on, and should, therefore, be entirely banished from surgery. Since the size of the abdomen varies, according to the different states of the viscera, and to the motions of its parietes in respiration, a non-elastic bandage must vary constantly in its degree of tightness, and keep up either too great or too little pressure. The omentum or intestine easily slip out when the opening is not exactly closed, and the patient who wears such a bandage must be in a state of constant insecurity. Those who lead an active life, or are obliged to use laborious exertions, will be more particularly exposed to risk. If the patient, after experiencing these defects, endeavours to remedy them by drawing the bandage tighter, he may confine the viscera, but he produces other inconveniencies. The increased pressure injures the spermatic chord, and

may affect the testicle: the integuments become red, painful, and excoriated; and the bandage must be entirely laid aside, until the parts have recovered. In Germany, where this kind is very much employed, RICHTER* has often seen painful tumefaction of the testicle, hydrocele, and even cirsocele, produced from this cause, and entirely dissipated by the employment of a proper truss. He also saw the pad of a non-elastic bandage excite, in the region of the abdominal ring, a considerable inflammation, which terminated after a few days in suppuration. The hernia never appeared again after the cure of the abscess. The inflammation had probably extended to the neck of the sac, and obliterated that part.

Elastic trusses, when well fitted, may be entirely depended on, as they keep up an uniform pressure under every variation of circumstances. They yield, when the abdomen is distended; and, in consequence of their elasticity, still remain closely applied, when its volume diminishes.

The valuable properties of this instrument depend entirely on its spring, which keeps the pad constantly pressed against the herniary opening; and gives it a power of re-action, by which an uniform pressure is maintained under varying

* *Traité des Hernies*, p. 24.

attitudes. This elasticity can be attained only by the employment of steel. In the first attempts at procuring something better than the non-elastic bandages, iron was used; and the instruments fabricated by Blegny at Paris were constructed of this metal. It is obviously inadequate to accomplish the ends which we have in view in treating herniæ: yet it is only at a comparatively recent period that its defects have been discovered. Arnaud, whose writings contain much valuable information on this subject, recommends for the spring of a truss a mixture of malleable iron and steel; so that the instrument may be moulded by the hand to any particular shape which the patient may require; and he is followed in this point even by Richter. A truss which admits of such management must in effect be exposed more or less to the objections which apply to the non-elastic bandage; and the only material, which possesses the requisite qualities of firmness and elasticity, is well tempered steel.

The most important part, then, of an elastic truss consists of a flat and narrow piece of steel, adapted to the form of the body, and called the *spring*. This passes round the affected side of the trunk, terminates anteriorly on an expanded plate of iron, to which it is rivetted, placed over the mouth of the sac, and extends behind to va-

rious distances beyond the spine. The posterior surface of the plate is furnished with a convex cushion termed the *pad*, and adapted in form and size to the opening, which it is designed to close. The spring is covered externally with leather, and that it may sit easily on the body, its inner surface is lined with some soft substance;* a strong strap extending from its posterior end passes round the sound side of the trunk, and is fastened to a hook on the front of the plate. This strap, being perforated by several holes, enables the patient to tighten or loosen the truss at pleasure.

The curvature of the spring should be accommodated to the breadth of the haunch in each individual, for this varies very considerably. Where the curve is too small, the pad cannot set with sufficient firmness on the ring; and, in the contrary case, the body of the bandage cannot apply exactly, but must be liable to derangement. The posterior extremity of the half circle should have its internal surface directed a little downwards; while that of the front end and pad should be turned slightly upwards, to make it fit

* This covering must be necessarily affected by the perspiration of the wearer; and where this is considerable it will injure the spring. Hare-skin, with the hair outwards, has been recommended as the best material in such cases.

closely. In order that the pressure of the instrument should be equally distributed over the whole surface, on which it rests, it should bear equally at all points. Hence the obvious importance of having the spring carefully accommodated to the shape of the pelvis. The makers of trusses should be provided with casts of the human figure for this purpose.

A piece of cork is fastened to the posterior surface of the iron plate; and this is covered with leather, stuffed with hair or wool, so as to give it the due firmness, and to bring it to a slight and uniform convexity. When the pad is too soft, the pressure must be insufficient; and if it is too hard, the soft parts will suffer: hence those formed of wood are particularly injurious. A French author* has proposed a bladder filled with air as a substitute for hair or wool in the pad. I know not whether this proposal has been much tried. The bladder would probably soon become flaccid, and the materials already mentioned answer every purpose.

Various inconveniences arise from the common fault of making the pad too convex at its middle part. The elevated centre pressing strongly, while the circumference has a very slight bearing, the parts may easily escape at the

* Heritz in the *Journal de Medicine*, t. 36.

sides, particularly under a slight derangement, which is a very probable occurrence. Moreover, since the force of the spring must be exerted almost entirely on one spot of the pad, a moderate degree of pressure quickly becomes painful. If the pad be flattened, it applies equally throughout, and the action of the spring is distributed over its whole surface: it will not produce pain, even although the elasticity of the bandage be considerable.

A too convex pad may also be injurious, when accurately applied, by pressing the external soft parts into the opening; thus keeping them distended, and preventing that contraction on which a radical cure depends. Its partial and considerable pressure may separate the tendinous fibres near the ring, and thus facilitate a second protrusion. We must not, however, run into the opposite error of making the pad too flat: elevation in the circumference is not only useless, but actually injurious. Pressure on the spermatic chord would be a probable effect of such a construction.

When the pad possesses the proper figure, the surgeon must be careful to ascertain that it exerts an uniform pressure by the whole of its surface. The upper part sitting too closely, allows the viscera to escape below; while an undue pressure at the lower part injures the spermatic

vessels, and admits of protrusion above. When it rests flat on the opening, and bears equally on all parts, the pressure is divided so as to cause no pain or inconvenience.

The size of the pad should be sufficient to cover the opening, and allow a few lines over in every direction.

A patient, who is ruptured on both sides of the body, must have a spring extending round the back and sides of the pelvis, and terminating anteriorly in two plates, each of which is furnished with a cushion for the hernia of its own side. A strap, sewed to one plate, and attached to a hook on the opposite side, serves to connect these together. A double truss is sometimes made with two distinct springs, but it does not possess the stability of the former kind. The distance between the two openings must be carefully marked in taking the measure for a double truss, and accurately observed by the maker in executing his instrument.

When in inguinal or crural ruptures the pad rises higher than its proper situation, the truss receives the addition of a thigh-strap, which passes from the back of the spring under the affected thigh, and is attached to the plate by means of a hook. The inconvenience arising from the opposite defect, in which the pad sinks too low, must be remedied by a band going over

the shoulders: we may sometimes accomplish our object, without making any addition to the truss, by merely changing the position of the hook to which the strap of the truss is fastened: when the pad rises too high, this hook should be placed towards the lower part of the plate, and vice versa. A truss exactly adapted to the figure of the body will probably not need such additions.

The measure for a truss is taken by passing a string round the body, from the point at which the viscera are found to protrude, in that situation which it is intended that the instrument should occupy. In order to obtain a more exact representation of the form of the trunk, it is proposed to take the measure with a double flexible wire, which may be bent exactly to the form of the parts. In either case, the alteration, made by covering the spring, requires that an inch should be allowed beyond the measure.*

* The following Works may be consulted on the Construction of Trusses :—

De Launay, *Bandage Elastique pour les Hernies; Mém. de l'Acad. de Chir.* t. 1, p. 697.

Camper; *Mémoire sur la Construction des Bandages pour les Hernies;* ibid. t. 5, p. 626.

Juville; *Traité des Bandages Herniaires;* dans lequel on trouve, independamment des bandages ordinaires, des machines propres à remédier aux chûtes de la matrice et du rec-

In order that a ruptured person may derive all the benefit which a truss can afford, and avoid as much as possible the inconveniences connected with its use, care should be taken, that the spring be constructed of a due strength; that the instrument sit close in every part, so as not to make any partial or irregular pressure; that it be not deranged by the necessary motions of the body; and that the form of the pad be adapted to the part on which it lies. When the measure has been properly taken, much must depend on the execution of the artist; yet attention on the part of the surgeon may often detect the source of inconvenience.

The strength of the pressure will be in proportion to the thickness and breadth of the spring. Small ruptures, and those which occur in children, or in persons who do not lead a laborious life, and are not obliged to make great exertions, may be retained by a weaker truss than is required for cases of the opposite description. As the omentum escapes from the abdomen much more readily than the intestines, an epiplocele

tum, à servir de recipient dans le cas d'anus artificiel, d'incontinence d'urine, &c. With fourteen coloured plates. Paris, 1786, 8vo.

Salmon's *Mechanical Analysis of Trusses, &c.* 8vo. London.

requires a proportionally stronger spring than an intestinal rupture. When the hernia is large and old, or the subject of it is exposed to the necessity of frequent laborious exertions, a strong truss is required. The patient should on no account wear a more powerful spring than his rupture requires, since the long-continued pressure of the pad must have the effect of weakening and injuring the abdominal ring and surrounding parts.

When the case requires so strong a spring, that the pressure on the spermatic chord is painful, the pad may be constructed with a hollow to admit this part. A similar contrivance may be found useful when rupture is combined with disease of the testis or spermatic chord.

In cases where an enlargement of the latter part has rendered it impossible to keep up ruptures by the common instruments, a pad, having a projection in its middle, just sufficient to fill up the opening, has been employed with success.*

The form of the spring, and consequently the position which it occupies at the side of the pelvis, is a point of the greatest importance in obviating the possibility of a derangement from the motions of the trunk or hip. Sometimes it is carried horizontally round from the pad; and

* Gooch's *Works*, vol. 2, p. 221.

then it goes so near to the trochanter major as to be very easily displaced by the motions of the thigh. To avoid this defect, it has been brought midway between the crista of the ilium and the trochanter; but the same inconvenience exists in a diminished degree.

A truss has been constructed by Mr. WHITFORD, surgeon's instrument maker, near St. Bartholomew's Hospital, different from any which I have hitherto seen in the form and course of the spring, and possessing apparently all the firmness and stability which can be bestowed on these instruments. The spring passes on the ruptured side just below the outer edge of the crista of the ilium, as far as the posterior superior spinous process of that bone. It then goes straight across to the same point of the opposite bone, and pursues its course, on the sound side of the pelvis, in the same relation to the crista ilii as it held on the side of the rupture, as far as the anterior superior spinous process, where it terminates as usual in a leathern strap. In this mode of construction the motions of the trunk and thigh cannot derange the instrument, which acquires a still further stability from the extension of the spring round the sound side of the pelvis. I have not seen enough of the actual employment of this truss to speak very decidedly on the subject. I know that it has answered the expectations of

the inventor in some cases, where the common trusses had been found inconvenient and insufficient; and I think it therefore an act of justice both to him and to the public to notice it on the present occasion, that it may be employed in a greater number of instances, and that its merits may be appreciated according to the result of these trials.

Trusses are sometimes fabricated with a pad moveable on the spring, instead of being rivetted to it. This may be inclined upwards or downwards, according to the form of the abdomen; and it is retained at the desired point by a spring fitting into the teeth of a rack. In others the plate contains a screw, by which the cushion is pushed further inward, or allowed to recede at pleasure. A simple instrument, when well made, answers every end which can be accomplished by these more complicated ones, and is therefore preferable to them for reasons which must be obvious.

A compress of folded calico, placed under the pad, and renewed daily, preserves the truss from the effects of perspiration; and certainly in many instances increases the beneficial operation of the instrument, although we cannot explain the principles on which this effect is produced.

If the unusual pressure should at first occasion redness and pain of the integuments, and even excoriation, the use of fuller's earth or pow-

dered lapis calaminaris will remove these effects.

The pad of the truss should be placed over the opening, at which the viscera have protruded: hence, in a small, or recently formed inguinal rupture, the proper position for it is considerably exterior to the pubes, and rather above that bone. The surgeon must, in all cases, endeavour to ascertain the precise point at which the rupture has taken place, and that is the right position for the pad. When he is going to apply the truss, he will place it round the pelvis, and put the patient into the recumbent position. Having carefully replaced the whole protrusion, he presses on the opening with one hand, and with the other applies the pad of the truss in its proper situation, holding it there until he has adjusted the rest of the instrument, and fastened the strap to the plate. The patient will follow the same plan in applying the instrument himself; and the most convenient time for this purpose is before he rises, as the viscera generally re-enter the abdomen during night, and have no disposition to descend again until he assumes the erect position.

When the bandage is applied, the patient rises, and the surgeon examines it carefully in every point, to see whether the skin is folded, pinched, or too much compressed in any situa-

tion. He may walk, cough, and make slight efforts for the purpose of ascertaining whether the parts are well kept up; and if they are not, it must arise from some error in the construction or application of the bandage, which will require attention.

If the viscera are well supported by the instrument, the patient may follow his ordinary occupations: yet he should bear in mind the affected part. Violent exercise or bodily exertion, and excess of eating or drinking should be avoided. The surgeon should examine him in two or three days. If any part has escaped, or if there be swelling or pain in the spermatic chord, some imperfection must exist in the instrument and must be remedied. The omentum very often escapes, and great difficulty is frequently experienced in keeping it reduced. It may be necessary, if the pad retains its situation on the ring, and the truss in general sits well, to tighten the strap a little. Some individuals find the pressure of the truss extremely disagreeable at first, although it is no more than the case requires. These may wear a very weak instrument for an hour or two daily, increasing the length of time of such application until habit has rendered its constant use supportable.

The use of an elastic truss not only keeps the viscera within the abdominal cavity, and

thereby protects the ruptured person from all the dangers, to which the existence of his complaint would otherwise expose him; but, if continued for a sufficient length of time, even affords a prospect of a radical cure. The constant pressure of the pad keeps the neck of the sac empty, and this part, together with the surrounding tendinous opening, contracts, in obedience to the general law, by which all hollow parts of the body adapt themselves to their contents. Sometimes the truss excites a kind of slow inflammation, which produces an actual agglutination of the sides of the aperture.

The appearances on dissection exhibit to us very clearly the effects of the constant pressure now alluded to. I lately met with two very large and apparently old scrotal herniæ in the same subject. On one side the omentum was adherent, the mouth of the sac very large, and the abdominal ring greatly dilated. Here of course no truss could have been worn. The ring presented the same appearance externally on the opposite side; but the hernial sac was empty, although its extent and the greatly enlarged state of the cremaster muscle covering it, with all other circumstances indicated that it was an old, and had been a very large rupture. The mouth of the sac was closed by slight adhesions, and gathered into folds, and the cellular substance

surrounding it greatly thickened. There can be no doubt that these appearances were caused by the pressure of a truss, which had thus nearly effected a radical cure in a very unpromising case. I have met with an empty hernial sac, the neck of which was greatly contracted throughout, and entirely closed at one point. An obliteration of the cavity of the sac at its entrance, adhesions of the formerly protruded parts at the orifice, and a thickened state both of the hernial sac, and the surrounding parts, have been found, on the examination of individuals in whom the use of the truss had effected a radical cure.*

* PARE found an adhesion of the omentum to the orifice of the sac in a patient radically cured by a truss. *Works*, book 8, ch. 16.

ARNAUD mentions a case of epiplocele, which was cured in six or eight months. The mouth of the sac was obliterated, and the omentum, in a flattened form, adhered to it generally. *Mem. de Chir.* 2, 474. In another instance the neck was obliterated, and fluid collected below.—Ibid, 1. 75. See also PETIT, *Tr. des Mal. Chir.* 2. 285; and again at p. 377, where he thus expresses himself. " J'ai trouvé qu' aux uns les parties " s'etoient rendues adhérentes à la portion du peritoine, qui " avoit autrefois formé le sac; qu' à d'autres, cette partie etoit " devenue epaisse, et adherente avec les anneaux des muscles, " avec le cordon des vaisseaux, et à tout le voisinage; que le " tout réuni ensemble formoit un rempart impenetrable aux " parties du ventre." SCHMUCKER has often seen the mouth of the sac obliterated by adhesion. *Chirurgische Wahnehmungen*, b. 2. p. 241.

Petit, who had ascertained these points in several instances, mentions another method in which the cure is effected; viz. by a restoration of the membrane, forming the sac, to its natural situation, so that the cavity is effaced, and the peritoneum lining the ring recovers its former polish and elasticity.*

As trusses, when skilfully employed, often excite, without pain, a slow inflammation, which terminates in the desirable object of obliterating the mouth of the peritoneal process, and thus effecting a radical cure; so, when placed with improper tightness, they have caused violent inflammation and suppuration, and exposed the life of the patient to the greatest risk†.

In proportion as the patient is younger, may we more reasonably expect a radical cure from the use of the truss. We may indeed speak with confidence on this point in the ruptures of children. Although cures sometimes take place in adults, they cannot be regarded as matters of

* Ibid, p. 283.

† Ibid. p. 340, 342. They were two omental herniæ; copious suppuration, and mortification followed; but the patient recovered, after incurring great risk. A case related by Mr. Wilmer terminated fatally from the same cause. Ed. 2nd. p. 84.

frequent occurrence; and they are not at all to be expected in old subjects.

Some practitioners are inclined to prohibit the use of a steel truss in infants, but there is no foundation for this exception, and the instrument may be employed with perfect safety in the youngest persons. No benefit can be derived from the employment of a non-elastic bandage, which is sometimes used in infants; and we may lay down a general rule, that the chance of a permanent cure is greater, the sooner we begin to employ the steel truss. The resistance in these cases is but weak, and a strong spring would therefore be not only injurious but useless.

A small and recent hernia, which has been produced by some accidental exertion, affords the most favourable prospect of a radical cure from the application of a truss; which, on the contrary, offers nothing more than palliation in large and old ruptures, and those whose origin may be referred to predisposition. An epiplocele is less likely to be permanently cured, on account of the difficulty of keeping it constantly reduced.

The truss must be worn without intermission by a person who hopes that its employment may cause such a contraction of the ring and sac, as will prevent any future descent of the viscera. The same rule should be observed by all, who are

obliged to wear these instruments. It would be better indeed that no truss should ever be used, than for the patient, after wearing one for some time, to lay it aside suddenly: for a hernia reproduced under these circumstances is much exposed to the occurrence of strangulation, in consequence of the thickening and contraction which are going on at the neck of the sac; and such an incarceration is particularly dangerous. If however the parts should not be strictured, their protrusion dilates the sac and ring, which had begun to contract, and destroys the benefit already derived; the cure therefore commences again from this period. The inconvenience and restraint, occasioned by the first application of the instrument, induce us to allow the patient to sleep without it for a short time; enjoining him not to remove it before he has lain down in bed, and to re-apply it before he rises. This practice must be discontinued as soon as the patient's feelings will admit of it; and the constant wearing of the truss must then be strictly enforced. It may be said, that the posture of the body in bed is a sufficient protection against protrusion, and it is well known that ruptures often recede spontaneously in the night. Yet a cough or any exertion may easily renew the descent, even in the recumbent position; and the patient who wears the instrument constantly is on the safe

side. He should have at least two trusses, and will find it pleasant to change them in the morning. When the covering is much worn, or rendered irritating by the perspiration which it imbibes, it should be immediately renewed.

When this plan of treatment has effected a radical cure, it may be laid aside; but, as the circumstances which indicate this occurrence are not clear, prudence requires a very cautious conduct on the part of the patient. If the contraction of the sac, or the agglutination of its sides be not complete, and the parts yield to a fresh protrusion, the patient is thrown back again to the point from which he set out. He may begin with leaving off the truss at night: let him afterwards place his hand on the opening, and then cough, hold his breath, or make slight efforts; if no tumour is occasioned, nor any preternatural impulse, the bandage may be left off at times during the day, all considerable exertions being carefully avoided. The longer he delays its entire abandonment, the greater is his security: and it is certainly better to continue wearing a truss beyond the period of actual necessity, than to leave it off too soon.

It must be allowed, after all, that trusses of the best construction, and most judicious application will not always prove a certain defence

against a protrusion. Various accidental circumstances may derange the instrument, and a portion of intestine, or more particularly of omentum, may slip out under the pad. For this reason bodily exertion should be avoided as much as possible; and the patient, when obliged to make any considerable effort, should press on the pad with his hand. If a protrusion should occur, let him immediately take off the truss, lie down, and either return the part himself, or send for his surgical attendant.

CHAP. VI.

THE RADICAL CURE OF RUPTURES.

IT may be collected, from the contents of the preceding chapter, that, in the majority of ruptures, trusses can only be regarded as a means of confining the viscera within the abdomen, and thereby obviating the inconveniences which the unrestrained increase of the swelling would occasion, and removing a constant source of those dangers which attend incarceration. It has been there explained, that the complaint can be cured by these instruments, only under certain favourable circumstances; and that, even then, a considerable time must elapse before the desirable termination can be reasonably expected. In general, therefore, persons afflicted with ruptures must submit to wearing the truss constantly; and further, since this is not in all cases a perfect protection, they must also incur the risk, which indeed is very slight, of the complaint assuming a more formidable shape. These considerations have led to several attempts at an entire cure, which should include, not only a return of

the protruded parts, but also a security against any fresh descent. The means designed to accomplish this object are called the *radical*, in opposition to the use of trusses, or the *palliative* cure. As they are now no longer practised, a detailed description of them will not be necessary; but their entire omission would have been hardly justifiable in a work professing to exhibit a view of the whole subject; more particularly as a statement of the question concerning the radical cure could by no means have been neglected.

The operations devised by the antients for the purpose of preventing the passage of the viscera into that production of peritoneum, which forms the hernial sac, were begun by a reduction of the parts, which were then retained by the hand of an assistant. A caustic was now applied to the skin, opposite to the ring, so as to form a small eschar. When this separated, if the sac were not sufficiently exposed, a caustic was again applied, until it was destroyed. The cure was then conducted by simple dressings, as in a common ulcer, and the cicatrix thus formed was expected to oppose the future descent of the abdominal viscera. Messrs. GAUTHIER* and MAGET are the last, who have employed this plan. Their caustic

* *Diss. sur l'Usage des Caustiques pour la guérison radicale des hernies*, 8vo. Paris, 1774.

was sulphuric acid. The dangers of the treatment, and the insuperable objections to its adoption are ably pointed out by Mr. Bordenave.* Of three patients who were made the subjects of experiment at one of the hospitals in Paris, one died, one suffered a relapse, and a third escaped with a swelling of the spermatic chord. Perforation of the intestine, and fatal gangrene of the scrotum were other consequences of this method. Such wanton trifling with the lives of men is of itself sufficient to excite our utmost indignation; even without the aggravating circumstance of learning that the name of De la Condamine is in the list of victims to this destructive quackery.†

Experience having shewn that the protrusion often re-appeared after the use of caustic, the following was proposed as a more effectual proceeding. After exposing the hernial sac, it was elevated, in order to carry the actual cautery to the very bone, and produce an exfoliation. A more firm barrier against protrusion was now expected; as the cicatrix would adhere to the bone.

* *Mémoire sur le danger des caustiques pour la cure radicale des hernies,* in the *Mem. de l'Acad. R. de Chirurgie,* tom. V. p. 651, and the Supplement, p. 881.

† Ibid, p. 668.

Other operators, having passed a needle and ligature through the skin and under the sac, placed a piece of wood between the two ends, and then tied them. They drew the knot closer and closer, until the included parts had perished. As the spermatic chord was intercepted, and the testis consequently rendered useless, that organ was removed: but some professed to include the sac only. Others removed the testicle at once, and tied the sac.

Lastly, in order to save the testis, some operators, having laid bare and opened the hernial sac, sewed it up with an uninterrupted suture. This method having for its object to preserve the testis, and to maintain it in a state capable of fulfilling its function—that of giving subjects to the king—was stiled the royal stitch.

The punctum aureum consisted in passing a gold wire under the spermatic chord and sac, and twisting it tight enough to close the latter, without injuring the former parts. A leaden thread, or a strong waxed ligature were employed in the same way.

The severe operations now described must have been attended with danger enough, if they had been performed by the most skilful surgeons; but they were generally practised by ignorant quacks and itinerant mountebanks, who, in moving about from place to place, after receiving

their fee, left the patients to their fate. ARNAUD* saw a man die of hemorrhage in a few hours after a Charlatan had publicly removed a large rupture and testicle. A travelling rupture curer, mentioned by DIONIS†, used to feed his dog with the testicles which he had removed. The animal was posted under the bed or table, near his master, waiting for the bonne bouche, while the spectators were made to believe that these precious organs were carefully preserved‡.

That unprincipled men should be ready to sport with the lives of their fellow-creatures for a trifling gain, and that they should find others credulous and weak enough to entrust themselves in their hands, is not at all a matter of wonder. But we cannot help being surprised at seeing

* *Memoires de Chir.* 2. 464.

† *Cours d'Operations*, p. 337.

‡ The author appears to consider that this emasculating process is not objectionable in ecclesiastics. " Les testicules sont des parties si nécessaires à l'homme, qu'on ne doit les oter, que dans une nécessité trés pressante : c'est pourquoi on condamne ces sortes d'opérations comme contraires aux loix divines et humaines : Elles seroient cependant excusables sur un religieux qui préféreroit la guérison d'une hernie à ses testicules qui lui doivent être inutiles, et il en tireroit pour lors deux avantages ; le premier, c'est que ses organes ne le tourmenteroient plus ; et le second, c'est qu'il seroit guéri d'une fâcheuse maladie." *Cours d'Operations*, p. 337.

that in modern times, the government of one of the most enlightened countries in Europe has allowed the itinerant rupture curers to practise their enormities unrestrained. By a report* presented to the Royal Society of Medicine in 1779, it appears that the intendant of Police at Paris had observed that many individuals, who came under his inspection, previously to entering the military service, had been deprived of one or both testicles by operators of this description. The Bishop of St. Papoul found that more than five hundred children had been castrated in his diocese: and more than two hundred had been mutilated at Breslaw. We find too that castration was still occasionally practised when SABATIER published his treatise on the operations†.

The celebrated Prussian surgeon, SCHMUCKER‡, has described and practised a method of operating for the radical cure, which would be much less objectionable than any of the preceding processes. It consists in exposing the hernial sac by

* *Rapport sur les inconveniens de l'operation de castration faite pour obtenir la guerison radicale des hernies, par* POULLETIER DE LA SALLE, ANDRY ET VICQ D'AZYR, in the *Histoire de la Société Royale de Médecine*, t. 1, p. 289.

† 1796.

‡ " Experiments on the radical cure of old scrotal ruptures by the ligature of the sac;" in *Chirurg. Wahrnehm.* b. 2. p. 236, et seq.

an incision through the scrotum; dissecting it carefully away from the integuments and spermatic vessels; opening it in order to push up the protruded parts; tying the neck as closely as possible to the abdominal ring, and then cutting off the remainder below the ligature. He practised this with success in two cases. DESSAULT† cured a congenital bubonocele at the hotel Dieu, by placing a ligature on the mouth of the sac.

The risk which arises from exposing the cavity of the abdomen is incurred in this manner of operating; and the ligature on the neck of the sac must be regarded as a probable source of irritation. As a means of general employment in reducible scrotal ruptures, its merits rest on the same grounds as those of the other methods.

The object of the proceedings above described was to close the mouth of the sac, and thereby to prevent a future protrusion. We may add, that if the end was attainable in this way, any of the measures would probably be sufficient. But, in truth, something more is required; we want a remedy that should contract the tendinous opening: for while that remains preternaturally large, a new protrusion is a highly probable occurrence. A cure might be expected in recent cases, which

† *Recueil Periodique*, t. 9. p. 290.

had arisen from violent exertion, or in a young subject; but in an old rupture, an old subject, or where the marks of predisposition are strong, there could be no hope. If the mere absence of an opening were sufficient to prevent hernia, the complaint would never occur; as the membrane is entire previous to protrusion. When the ring has been dilated by the descent of the viscera, we should be quite unreasonable in expecting the mere closing of the sac to form a sufficient obstacle to a fresh protrusion. The insufficiency of the methods is tacitly acknowledged by the recommendation of wearing a bandage for some time afterwards. We find that the herniæ often appeared again in those who had undergone the operation*; and we know that a renewal of the protrusion is so frequent after the ordinary operation for incarcerated hernia, that the use of a truss is universally adopted, as a means of prevention. Since then the cause of the complaint, the enlarged state of the tendinous opening, is not removed by the processes adopted for a radical cure; since a recurrence of the disorder is not prevented, we may assert without hesitation that

* Acrel operated in several cases of reducible hernia; some were radically cured, while the complaint returned in others. *Chirurgiske Händelser*, see *Lond. Med. Journal*, v. 3. p. 13.

these operations do not afford any greater chance of complete relief than the employment of the truss.

Here we come to a most important distinction between the two means. The latter is attended with no danger; it causes at most only inconvenience, which diminishes daily, and soon entirely disappears: while the former is highly dangerous, and has proved fatal in many instances. The result of our experience on this subject is contrary to what many persons would have expected. An operation not considerable in itself, performed on a perfectly healthy subject, would seem at first view to carry with it but little risk. Let it be remembered, that the cavity of the peritoneum is laid open, and that the consequences of such an exposure are hazardous under any circumstances. An appeal to experience will shew that the operation is at least as dangerous as that for strangulated hernia. ARNAUD* has recorded two cases of simple epiploceles, where the omentum could not be kept up, and the patients were thereby exposed to such inconvenience, as induced them to seek relief from the operation. They both died. SHARP† witnessed a similar termination in two or three patients who were

* *Mem. de Chirurg.* 2. 453, 456.

† *Treatise on the Operations*, ed. 10. p. 26.

strong and healthy before the operation. ACREL* lost a patient in the same way.

The experience of PETIT is still more decisive on the same point. The very candid manner, in which he states the unfortunate termination of his operations, is so honourable to him, that the reader will be pleased to read it in his own words. The extract will convey an important lesson. "We can be justified in operating on a hernia "only by the strangulated condition of its con- "tents. The following observations have made "too strong an impression on my mind, to ad- "mit of my advising or practising this measure, "as the ancients did, merely with the view of "procuring a radical cure. I recollect, with "feelings of painful regret, that I have twice "operated under these circumstances, and have "seen the same practice followed three times by "my colleagues; without reckoning several nar- "ratives which others have given to me of their "experience." The first operation was performed on a young man of twenty-five. Every previous precaution likely to insure success, was adopted; and the subsequent treatment appears to have been, in every respect, judicious. The patient died on the sixth day: inflammation had spread over the whole peritoneum, and its marks were

* *Lond. Med. Journal*, 3. 13.

particularly conspicuous on the stomach, intestines, and omentum. In a woman of the age of forty, with an entero-epiplocele of the size of a fist, very alarming symptoms followed the operation, and life was despaired of on the fifth day. She, however, afterwards recovered. The third operation was performed in the presence of PETIT. Its execution, and the subsequent treatment were conducted, according to his representation, with all possible skill. Here death took place on the tenth day, from peritoneal inflammation.

" I am not the only person who has observed " that operations on unincarcerated herniæ are " not so favourable as those performed on incar- " cerated cases. Several of my brethren have " made the same remark*."

In two cases operated on by Mr. ABERNETHY the patients were brought into extreme danger by subsequent peritoneal inflammation.†

The subject of an incarcerated rupture submits to the operation to save his life. But he, whose hernia is reducible, exposes his life to avoid an inconvenience; and the operation affords no greater prospect of entire recovery than he had without it. Indeed he cannot be consi-

* *Traité des Mal. Chirurg.* 2. 354--357.

† *Surgical Observations*, pt. 2, p. 5, et seq.

dered as free from the danger of a relapse, without continuing to wear a truss. All these considerations apply with so much the greater force in the present day, since the improvements in the construction of trusses have diminished the inconveniences attending their use, and afford, not indeed a complete, but a very great, protection from the risks of ruptures. The antient surgeons might find an excuse, in the imperfection of their palliative means, for the hazardous measures by which they attempted a radical cure: and the serious evils arising from the unchecked increase of ruptures would naturally and reasonably lead the sufferers under such disorders to submit even to a hazardous mode of relief*. The prevalent

* The following statement concerning the Swiss peasantry presents a lively picture of the sufferings produced by ruptures where the means of relief are imperfect. "Sed miseri ob "hunc affectum Helvetiorum ruricolæ considerandi nobis jam "ulterius veniunt, qui herniis fidem fere humanam superan- "tibus interdum premuntur; haud raro enim intestina vix "non omnia in scrotum prolabentia adeo illud extendunt ut "absque stupore ejusmodi hernia non possit aspici. Mem- "brum sæpe virile fere totaliter absconditur, ita ut nonnisi "foramen, per quod urina mittitur, de eo appareat; quando- "que si in ejusmodi statu misero duris adhuc laboribus agi- "tantur, facile τῳ miserere vel strangulationi intestinorum "ansa subministratur. Adde quod etiam eo quo fruuntur "victu excitentur tormina, arctæ insuper bracheriorum liga- "turæ illos arceant a laboribus, sudor quoque a fortiori nisu et

belief that these disorders are accompanied with a diminution of the sexual powers would increase the desire of a radical cure, and provide, in an age when surgery was imperfectly cultivated, a constant source of imposition to the artifices of unprincipled persons.

RICHTER has hinted at the possibility of obtaining a radical cure, in a short space of time, by the pressure of a tightly applied truss. "Since "inflamed parts contract adhesions when in con- "tact, might we not," says he, "by means of the "bandage, obtain in most cases a radical cure; em- "ploying it so as not only to compress the neck of "the sac, but also to excite inflammation in the "part? A truss with rather a hard pad should "be employed for this purpose, drawn sufficiently "tight to cause pain, and kept on until the pain "is considerable, attention being paid to guard "the spermatic chord. I think this would be "the most easy and certain method of accom- "plishing a radical cure; and I have strong "reasons for supposing that I have seen several "individuals cured in this way." The imme-

"labore affluens subligaculum madefaciat, unde insignes mo- "lestiæ ortum trahunt. Per madefactum enim subligaculum "et fortiorem motum cutis inter laborandum insigniter atte- "ritur, et exinde producta vulnuscula tam urenti, et acuto "dolore eos excruciant, ita ut semper operationi se subjicere, "quam tantis doloribus obnoxii continuo vivere malint."

Freytag in HALLERI, *Disp. Chir.* t. 3. p. 70.

diate connexion of the hernial sac with the cavity of the abdomen, the facility with which inflammation spreads over continuous membranous surfaces, and our entire inability to limit its progress to the desired spot, are very strong arguments against this proceeding. They expose the patient to a risk, which the desire of removing a mere inconvenience cannot justify*.

The proposal of DESSAULT for the use of the ligature in umbilical hernia will be explained in the chapter on that subject: the propriety of operating on irreducible cases is considered in the next chapter; and the methods, which have been recommended to promote the radical cure, in the operation for incarcerated hernia, will be examined in the section on the operation.

* See the cases quoted in the preceding chapter, page 80, to shew the danger of trusses which exert a strong pressure.

CHAPTER VII.

TREATMENT OF IRREDUCIBLE RUPTURES.

THE reduction of a rupture may be impracticable, although the protruded parts suffer no strangulation. Increased volume of the hernial contents, preternatural connexions of the parts to each other, or to the hernial sac, and membranous bands of adhesion crossing the cavity of the latter, are the causes which prevent reduction in these cases.

Thickening and enlargement of the mesentery and omentum are the most frequent circumstances under the first of these heads. In irreducible ruptures of long standing, much of the mesentery gradually passes into the sac: this part, as well as the omentum, cannot increase greatly in the confined situation of the ring, but there is no obstacle to their augmentation below. The enlarged portion in the hernial sac is connected to the sound parts in the abdomen, by a comparatively thin process, and this conformation must be a great obstacle to reduction.

Adhesions of the parts proceed probably from the occasional irritation which may be derived from pressure of the ring: and other accidental causes may assist, in a neglected rupture, in producing this effect. They assume various forms, and exist in very different degrees. Sometimes there are tolerably long and separate filaments; sometimes the parts are united into one mass by a close and general connexion. The consistence of these adhesions is equally various. The protruded viscera may adhere to each other; to any part of the hernial sac; or to the testis, where they are contained in the tunica vaginalis.

Adhesions generally occur in old herniæ, which have been left to themselves, and seldom, if ever, returned. They may also exist in recent and small cases. The omentum contracts such connexions very readily, and much more frequently than the intestines. Herniæ, which have been incarcerated, will very probably go into an adherent state; in consequence of the inflammation which they have experienced. In old and neglected ruptures we may expect adhesions as well as enlargement of the protruded viscera.

It is often difficult to determine whether adhesions are present, except from the obvious circumstance, that the tumour cannot be reduced. If the swelling can be replaced in part only, the

existence of preternatural connexions is probable; and it is still more strongly indicated, if the scrotum or the testicle be drawn up towards the ring, when attempts at replacement are made.

The most certain, and, indeed, the only method of avoiding the formation of adhesions, is the early reduction and exact retention of the prolapsed parts, by means of a truss. This kind of precaution is more important in an omental hernia, for the reason above stated.

In the sac of an irreducible hernia, where the passage into the abdomen must have been prevented by adhesions, water has been known to accumulate in such quantity as to cause pain, and other considerable symptoms, and to render an opening necessary for its evacuation.*

An irreducible hernia must be left, in great measure, to itself. Its bulk and gradual increase are sources of inconvenience, and the constant possibility of strangulation exposes the patient to considerable danger. The chance of incarceration is not, indeed, very great in these cases, since the ring is enlarged and weakened by its long distension, and the adhesion of the viscera, if it has occurred about the mouth of the sac, may prevent the introduction of a fresh part into

* Monro; *Edinburgh Medical Essays*, vol. 5. Schmucker; *Vermischte Schriften*, b. 2, p. 55.

the opening. Yet experience proves that strangulation may occur, and that these swellings become gradually larger. For these reasons, it has been proposed to open the sac, to destroy the adhesions, return the parts, and thereby produce a radical cure.

But, if this proceeding be not admissible in a case of reducible rupture, it is opposed by much stronger arguments, under the circumstances we are now considering. The danger of the operation is infinitely greater, as a very large surface is exposed, and the adherent parts separated by the knife in a long and difficult dissection, must also go through the processes of inflammation and suppuration. Let it be further considered that the parts contained in a large and old hernia, cannot always be kept up in the abdomen, from the diminished capacity of that cavity; examples of which are related in the present chapter, as well as in the section which treats of the operation on large herniæ. Lastly, the occurrence of strangulation is not probable; and, if it should appear, its progress is slow, and relief may be obtained by milder means: yet an objection must be made to the general rule of not operating in irreducible herniæ, in behalf of those instances, where the tumour occasions such essential inconvenience and suffering to the patient, as induce him, when the dangers he incurs have been fully

represented, to submit to the operation. Such was the case of the celebrated ZIMMERMANN.* The omentum adhered by a single filament to the testicle: when the former was replaced, the latter ascended with it, and experienced very painful pressure from the ring: if the parts were allow- to protrude again, a portion of intestine gene- rally followed, was pressed on by the ring, and occasioned a fear of strangulation. The pressure of a truss occasioned such severe suffering that it could not be borne. In a patient, on whom Mr. ABER- NETHY† operated, an adherent epiplocele gave rise to frequent protrusions of the intestine, which were highly distressing. In both these cases there existed a particular source of danger and incon- venience, which admitted of no remedy but the operation.

Surgical observers‡ have recorded several cases, in which large, old, and irreducible rup- tures, in consequence of long confinement to bed, have returned completely into the cavity of the abdomen. It has been proposed to imitate this operation of nature by the efforts of art, and the attempt has, in some instances, been attended with

* Related by MEKEL, *de morbo hernioso congenito, singu- lari*, &c. 8vo. Berol, 1772; and by SCHMUCKER, *vermischte Schriften*, b. 2.

† *Surgical Observations*, part 2, p. 5.

‡ FAB. HILDANUS, cent. 5, obs. 54.—POTT's *Works*, vol. 2, p. 73,

success. By confining the patient to bed, by restricting him to a light and sparing diet, and by the employment of venesection, calomel, purgatives, and clysters, ARNAUD* accomplished the replacement of a vast scrotal rupture, which had existed from infancy; and succeeded in numerous herniæ which resisted every other method. His assertions on this subject are corroborated by the testimony of LE DRAN†, who witnessed the progress of many of his cases. The same plan has been successful in several instances in the practice of Mr. HEY.‡

This treatment must induce a general state of weakness and relaxation, particularly favourable to the return of the protruded parts: it must also operate powerfully, by causing the absorption of accumulated fat, in reducing the bulk of the hernial contents. For the latter reason we should expect it to be particularly successful in such ruptures as consist, for the most part, of omentum; and the recorded experience on this subject justifies our conclusion. In combination with the measures above described, considerable assistance may be derived from keeping up a con-

* ARNAUD *on Hernia*, p. 292. Also his *Mémoires de Chirurgie*, tom. 2, pp. 476, 486, 498.

† *Traité des Operations*, p. 114.

‡ *Practical Obs.* p. 219.

stant pressure on the tumour, by means of a suspensory bandage, made to lace in front, and diminished in size, according as the contents of the swelling recede.* When the reduction of the tumour has been effected, it must be kept up by the application of a truss.

In some instances, where the parts have been returned, the ultimate success of the plan has

* When the size of the tumour is not very considerable, PETIT advises that its reduction should be attempted by means of trusses with hollow pads: and it appears from his representation, that these have been employed frequently in France with success. "Trusses designed for this purpose are not made with a common pad; but the latter part is excavated, and they are called 'bandages à cuilliere;' in others the part corresponding to the pad is a circle, triangle, or oval of thin steel: a piece of cloth covered with chamois, and more or less tense, is sewn to the inner border of this steel, and such are called 'brayers en raquette.' When instruments of these descriptions are used, they must be tightened from day to day, as the tumour diminishes, with great caution, the local effect, and the feelings of the patient being always regarded."

"It used to be stated as an axiom, that herniæ with adhesions could be reduced only by an operation: but since the management of hollow pads has been understood by surgeons, we have reduced and kept up several of these. Confinement to bed, and a strict regimen, are necessary parts of the plan."

He says that, when the intestine has passed up, in a mixed case, the omentum, if irreducible, becomes accustomed to the pressure, is diminished in size, hardened, and consolidated with the sac, so as to prevent future protrusion.—*Tr. des Mal. Chir.* tom. 2, p. 335—346.

been frustrated by an unexpected occurrence. The parietes of the abdomen have become so far adapted to the diminished quantity of the viscera, that the sudden introduction of a large additional bulk could not be borne. A patient, who persisted for a long time, under the direction of SCHMUCKER*, in keeping the parts reduced, was brought into a state of the greatest extremity, which absolutely compelled him to remove the truss. This gentleman has seen many instances of the same kind: PETIT has even known the practice to prove fatal: the application of the truss after reduction caused nausea and vomiting, and other distressing symptoms, which rendered its removal necessary, yet the hernia did not come down again, nor did the symptoms cease; and the patient died, as it appeared upon dissection, from inflammation of the peritoneum.†

In the case of an irreducible omental hernia of moderate size, a truss with a hollow pad may be recommended, but an enterocele will not bear this treatment.

Mr. COOPER has accomplished the reduction

* *Chirurgische Wahrnehmungen*, vol. 2, p. 243. In two cases, where ARNAUD had returned large herniæ, vehement colic compelled him to remove the bandage, and let out the parts. They were afterwards replaced more gradually. *Mém. de Chir.* tom. 2, p. 495.

† *Tr. des Mal. Chir.* tom. 2, p. 392, 393.

of herniæ, in some instances, after the previous application of ice to the swelling.

A person, who has a hernia incapable of reduction, is exposed to much greater danger than the subject of a reducible rupture. Strangulation may take place at any time, in consequence of some straining or exertion; and complaints arising from affection of the intestinal canal make their appearance on the slightest exciting cause: hence it is particularly incumbent on patients of this description, to avoid all unusual efforts; and, by a strict attention to diet and the state of the fecal discharge, to keep the alimentary canal, as nearly as possible, in a healthy condition. Costiveness should be particularly guarded against.

The use of a suspensory bandage will obviate some of the inconveniences arising from the swelling, by supporting its weight, and exerting a general pressure likely to prevent increase.

I have observed that large and irreducible herniæ become seldom strangulated. The obstruction, when it occurs, is generally of that species which arises from accumulation of the intestinal contents; and the proper treatment will consist in the employment of moderate external pressure, purgatives, and clysters. The conduct which should be followed, if these means

are ineffectual, is pointed out in the section "on the mode of operating on large herniæ."

Irreducible herniæ must of course be exposed to all the consequences of external injury and violence; hence, various cases are recorded, in which the bowels have been burst by blows,* falls,† &c.

* Cooper, part 2, pref. p. 2. Laceration of the intestine and mesentery, without any injury of the integuments.

† *Ibid.* p. 47.

CHAPTER VIII.

TREATMENT OF STRANGULATED RUPTURES.

THE indication of cure in incarcerated hernia, is to liberate the parts from stricture, and to replace them in their natural situation.* The treatment of the complaint, when examined in detail, will appear more complicated than this view of the subject would lead us to expect; for, as persons of every age and constitution, and of all ranks and conditions of life, are subject to the

* The propriety of establishing this, and this only, as the indication of cure for strangulated hernia, is so striking and obvious, that it would have been almost unnecessary to notice it here, had not RICHTER and CALLISEN, two of the most celebrated modern surgeons, represented the matter in a different light. The objects of surgical treatment in this disorder, according to these writers, are, to obviate inflammation; to subdue spasm; to procure evacuations; and lastly, to replace the rupture: thus they combat the effect while the cause continues to operate. The last is the only rational indication, and its accomplishment necessarily includes the attainment of the other objects.—See RICHTER *Anfangsgründe der Wundarzneykunst*, vol. V. p. 238. CALLISEN *Systema Chirurgiæ Hodiernæ, pars posterior*, p. 464.

disorder, the means of accomplishing the general indication must be modified by these circumstances: hence we find that various methods of treatment have been proposed, which, though very different, and sometimes almost opposite to each other, may yet be all of them eligible in particular cases: their respective merits may in general be estimated by the degree in which they contribute to the accomplishment of the abovementioned object.

In every instance of strangulation, the surgeon either can or cannot determine the cause and particular species of the disorder: in the former case his treatment will be guided by the knowledge he has of those circumstances; while, in the latter, he follows general rules, and employs, without any particular indication, those means of which experience has proved the efficacy. The last, or empirical method, is followed by most surgeons, who, in compliance with it, adopt measures which of course are often useful and proper, but which are also sometimes improper and injurious. That an attention to the cause and kind of the disorder is essentially necessary to a judicious and sucessful application of the curative means, must be obvious of itself: but frequently these points cannot be made out, and the surgeon perceives nothing more than the

existence of the incarceration: here he must resort to the empirical treatment.

The principal means, which have been adopted for the cure of strangulated hernia, are bleeding; the warm bath; purgative medicines by the mouth, and in the form of clyster; injections of the decoction or smoke of tobacco; opiates and other antispasmodics; the cold bath, and various cold and warm applications to the part. The works of surgical writers afford numerous instances, in which all these methods have been successful; and the practice of most individuals would furnish similar results. But the recital of single cases tends, as Mr. HEY has well observed, to advance our knowledge very little: our object should be to ascertain the comparative merits of each mode, and to deduce from thence general rules of practice. With this view I shall consider separately what is to be said on each of the above-mentioned methods.

SECTION I.

The Taxis.

WHEN a surgeon is called to a case of hernia, he attempts, in the first instance, to replace the

protruded parts; which operation is technically termed the *taxis*. When the swelling is free from stricture, this replacement is generally very easy; but when the parts are more closely girt, the operation is rendered proportionally difficult, and requires that attention should be paid to the position of the body, and to other circumstances, which may influence the chance of success. The patient should lie down when we attempt the taxis, as many circumstances prove that the recumbent position contributes materially to the return of the prolapsed parts. When the rupture is of the inguinal or crural kind, the pelvis should be placed higher than the shoulders, so that the swelling itself may constitute the most elevated point of the trunk. The patient's bladder should be previously emptied; and he must carefully abstain from coughing, holding his breath, or any similar efforts. These precautions procure us as much room as possible in the abdominal cavity, and favour the return of the protruded parts, as far as that object can be effected, by the force of gravity.

The position of the patient must also be regulated with a view to the opening, through which the parts have descended. Hence, in inguinal and crural hernia, the thigh should be bent, and rolled inwards; in order to relax the tendon of the external oblique muscle. It is also

recommended to elevate the shoulders slightly, as well as the pelvis. This brings the trunk into a curved state, and completely relaxes the abdominal muscles. Since the position now described is the most favourable to the return of the protruded parts, it should be continued, as nearly as circumstances will admit, until the rupture is replaced.

When things are thus prepared, the surgeon begins his attempt by a gentle pressure on the tumour, which may be gradually increased, but should not be carried to such an extent as to cause pain: violence cannot indeed be beneficial, as it is more likely to press the parts in a mass against the ring, and thereby bruise and injure them, than to urge them through the opening.

Numerous instances are recorded, in which this unscientific roughness has produced the most injurious consequences. Suppuration of the omentum*, and gangrene or rupture† of the intestine

* Arnaud, *Mem. de Chir.* 2. 546.

† Cooper's *Anatomy of Inguinal Hernia, &c.* p. 23. Bell, *System of Operative Surgery*, v. 1. pl. 7 and 11. Morand, *Opuscules de Chir.* t. 2. p. 160. Petit, *Tr. des Mal. Chir.* 2, p. 328. "Combien de fois," says the latter writer, "a-t-on "vu périr des malades le même jour que la réduction leur a "été faite? a l'ouverture des cadavres, on a trouvé, aux uns

have been its more immediate or remote consequences: and the danger of the subsequent operation must be greatly increased if the attempts at reduction are ineffectual.

We usually grasp the tumour with one hand, while the other is placed at the aperture, where it may be employed in facilitating the entrance of the parts, and in keeping up those which have been already returned. Success will often be obtained by exerting a general pressure on the whole surface of the swelling; in which method, both hands must be employed in order to subject the entire tumour to the action of the force. This method is strongly recommended by PETIT*.

The pressure should be exerted according to the course in which the parts have been protruded: thus, the contents of a bubonocele pass obliquely downwards and inwards; those of a femoral rupture downwards and then forwards; yet we should not confine ourselves entirely to such a kind of pressure as the course of the hernia would suggest; but, in failure of those attempts, make other trials in different directions.

The following manœuvre will sometimes succeed in a bubonocele or scrotal hernia, after

'' le boyau gangréné, aux autres il étoit crevé, et les matieres '' fécales repandues dans le ventre.'

* Libro citato, p. 323—328.

the more ordinary methods have failed, particularly in cases, where the strangulation seems to have been caused by an accumulation of fecal matter. Let the surgeon embrace the neck of the swelling, close to the tendon, with the finger and thumb of one hand, and carry them downwards with a moderate pressure, so as to remove the contents from the portion next to the ring; this will reduce the size of that part, which he may then attempt to pass into the ring with the other hand. Indeed, since the obstacle exists at the mouth of the sac, reduction will in general be more easily effected by pressing the upper part of the tumour towards the ring, than by exerting a general pressure over the whole swelling.

The surgeon should place himself in a situation which he can occupy without inconvenience for a considerable time, since he must persist in his attempts for an hour in some cases, before he gives up the expectation of success; and it often happens that, by perseverance in trying various positions and modes of pressure, herniæ are ultimately replaced, which did not yield at all to the first attempts.

If the efforts at reduction, managed according to the above directions, are not attended with success, the following method has been recommended. A strong man placed in a convenient

position near the edge of the bed, supports the lower extremities on his shoulders, so that the patient's head and chest only rest on the bed. Attempts at reduction in this posture are said to have succeeded after every thing else had failed, and have therefore been highly recommended by some surgeons. I cannot fairly appretiate the merits of this proposal, as I have never adopted the practice, nor seen it employed by others. It does not seem to me to promise any advantages that could compensate for the unpleasantness, trouble, and inconvenience inseparably connected with its employment. The proposer of this manœuvre must have expected to accomplish reduction by the mechanical effect which the weight and dragging of the viscera in the abdomen would have on the protruded parts. That this idea is completely absurd, must be immediately perceived by any one who forms a just notion of the natural state of parts; who is aware that the abdomen is accurately full, and that all its contents are preserved in their relative positions by the pressure of the respiratory muscles; that they cannot therefore fall from one part of the cavity to another, but are probably just in the same place, whether the head or the heels be the most elevated point of the body. Reduction is opposed by the pressure which the protruded

parts experience, and this position can neither overcome nor diminish that obstacle.

The return of a piece of intestine is generally preceded by a peculiar noise, caused by the passage of air through the strictured part. It recedes at first gradually, and then slips up suddenly. The omentum goes up slowly to the very last portion, which must be actually pushed through the opening.

If the taxis should not succeed at first, it may often be successfully repeated after the use of the warm bath, bleeding, or cold applications.

The chance of returning a hernia will be proportionate to the size of the opening: hence small tumours are the most difficult of reduction, as they are always attended with the closest stricture; and this difficulty is experienced particularly in crural ruptures, from the extreme narrowness of the aperture through which their contents descend. The probability of replacement is also materially influenced by the duration of the complaint; it is much less in the later than in the earlier stages of the strangulation, from the inflammatory disorder which arises in the prolapsed parts.

When the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. A sufficient pressure cannot now be endured; and the force, which is

employed, only tends to increase the inflammation, and accelerate the approach of gangrene. At this period the operation is required, and should be performed without delay.

The surgeon is not warranted in relying on the taxis as his chief method of accomplishing reduction; he should not waste in unavailing efforts of this kind, that time which ought to be devoted to the prosecution of more vigorous measures. When he cannot reduce a rupture at one fair trial, he has less and less chance of effecting this object in the subsequent progress of the case, unless he can produce an alteration in the state of the tumour by other means.

My opinion on this subject is confirmed by the experience of RICHTER, whose words I shall take the liberty of quoting.

" Je n'ai vu que trés rarement une hernie " vraiment incarcérée etre réduite par le taxis, " et lorsqu'on a pû la réduire, les circonstances " avoient été tellement ameliorées par d'autres " moyens, et les parties rentrerent si facilement " et si inopinément, quoiqu'on eut fait auparavant les tentatives en vain, que j'ai penché " toujours a croire qu'elles seroient rentrées d'elles " mémes quelques heures plus tard*."

* *Traité des Hernies, par* ROUGEMONT, p. 66.

Mr. Hey* also advises us to be cautious of doing too much, as he has seen great harm arise from long continued efforts to replace the strangulated intestine.

The opinion of Richter and of Mr. Hey receives the strongest confirmation from the experience and reasoning of Dessault†. Long practice had shewn that justly famous surgeon, that ruptures, in which the inflammatory symptoms are strongly marked, are seldom returned by the taxis, and that the repeated and forcible attempts at reduction‡ employed before the operation, have a most decidedly unfavourable influence on the event of the case; hence he was led to proscribe the taxis in the inflammatory strangulation, until the previous use of other

* *Practical Obs.* p. 144.

† *Œuvres Chirurgicales de* Dessault, par Bichat, tom. II. p. 332—338.

‡ Those, who have seen much hospital practice, will recognise the justice of the following remark. "Il en est des "hernies etranglées comme de l'introduction des sondes "dans les rétrécissemens de l'urétre; il faut, avant de re- "courir aux derniers moyens, que chacun se soit épuisé en "secours préliminaires; il faut que l'effort de tous les con- "sultans passe, pour ainsi dire, sur la tumeur; s'ils sont "nombreux, est-il possible qu'elle ne soit pas meurtrie, de- "chirée surtout si, comme il arrive, chacun cherche a l'envi "à obtenir, a force de pressions ce à quoi n'a pu réussir celui "qui l'a précédé?"—p. 336.

means had produced a change in the state of the swelling; and he justifies his conduct by the comparison of two lists of patients operated on at the Hotel Dieu : in one of these were contained the names of patients, on whom reduction by the hand had been attempted before the operation in the usual manner; and in the other, of those, who had been operated on without such attempts*.

The reader will not, I hope, conceive, that the remarks, which I have now made, are intended to convey a general disapprobation of the use of the taxis. They are applied to those cases only, in which the existence of considerable pain in the swelling and abdomen, together with other circumstances, denotes that the incarceration is of the inflammatory kind. Where the rupture is tolerably free from pain and tension, and the

* The remarks of PETIT on this subject coincide with those of DESSAULT.

" Il y a des gens qui veulent réussir, et qui se vantent " même de les réduire toutes : malheureux les pauvres ma- " lades qui tombent entre leurs mains; ils compriment trop " l'intestin, la meurtrissure qu'ils y font, devient quelquefois " mortelle par l'inflammation et la gangrene qui y survien- " nent. J'ai été plus d'une fois appellé en pareil cas, et j'ai " fait avec répugnance des operations aux malades sur qui l'on " avoit fait de pareilles tentatives."—*Tr. des Mal. Chir.* t. 2. 327—328

general character of the case is slow and languid, a judicious use of the taxis can never be injurious. And, although it is undoubtedly true, that the first attempt is the most likely to be successful, and that the hope of reduction diminishes as the strangulation continues, it does not follow that other trials should be proscribed. They may be renewed, when the means employed to promote the return appear to have made any favourable change in the tumour, or in the general condition of the patient.

Mr. WILMER* of Coventry, has suggested a plan, which should be noticed in this place. He proposes to make pressure by means of a weight left on the part for several hours. It succeeded with him in two cases. A two pound leaden weight was employed in one of these, and a common smoothing iron in the other. If the swelling were free from pain, and the circumstances not urgent, there could be no objection to a trial of this method.

* *Practical Obs. on Herniæ*, ed. 2nd. Case 1 and 2.

Section II.

Treatment after Reduction.

The patient is not to be considered as free from all danger, even when the rupture has been reduced. Generally, indeed, the symptoms are immediately relieved, and complete recovery speedily follows. But the cause of the strangulation may be of such a nature, that the reduction does not affect it; and its continued operation is indicated by other effects, although it no longer produces incarceration. The patient may suffer under symptoms produced by the strangulation; as, for instance, inflammation of the bowels, which may be apprehended particularly when the incarceration has lasted long, and has been violent. Or the complaint may have been inflammation of the parts in the hernia, and then the situation only of the affected organs is changed.

If the strangulation has been caused by any disorder of the bowels, the mere replacement of the prolapsed parts cannot be expected to restore the patient to health. Even under other circumstances, the existence of the obstruction is a

source of irritation to the intestinal canal, which cannot with safety be overlooked by the surgeon. The symptoms will not entirely disappear, until evacuations per anum have occurred; and these in general do not take place spontaneously. The bowels are irritated and oppressed by the accumulation of their contents consequent on the obstruction. Hence mild purgatives, such as small doses of vitriolated magnesia, and clysters, should be ordered immediately after the reduction, and repeated at proper intervals, until the whole collection is cleared away.* This conduct will be more particularly necessary if the strangulation appears to have arisen from accumulation of the intestinal contents.

Where inflammation has been excited, previously to reduction, the effect will not cease, on the removal of its mechanical cause†. A continua-

* Richter has been surprised at the prodigious quantity of alvine discharges, produced by the action of purgatives, after the reduction of a strangulated hernia; and he believes that a species of gastric fever follows violent strangulation. He has seen, under such circumstances, a true bilious fever; continuing for several days, and removed by the repeated employment of purgatives. He warns us against confounding a feverish affection of this kind with the effects of inflamed bowels; since bleeding, and the other means necessary in the latter case, would only aggravate the evil in the former.—*Tr. des Her.* p. 68.

† Death has occurred from peritoneal inflammation, in a

tion of the symptoms of strangulation, together with those which indicate inflammation in the abdomen, will then require bleeding, and the other antiphlogistic treatment, until these alarming appearances are removed.

It is possible that the rupture may not be completely reduced; a small portion of intestine may be still included in the stricture. If this keeps up the symptoms, and is irreducible, the operation becomes necessary.

A strangulation of the bowels, when returned, has been caused by preternatural adhesion, or uncommon conformations of the omentum. These occurrences are extremely rare, and cannot possibly be discovered during the patient's life.

Lastly, it has been thought possible that the hernial sac may be returned, with its contents, and that its neck, in a thickened and indurated state, may keep up the strangulation. Le Dran* first asserted this in the case of a femoral rupture, where he found, on dissection, the sac pushed into the abdomen, with its contents; and still firmly including them. De la Faye† and Ar-

case where an inguinal hernia had been returned without any delay.—Camperi, *Icones Hern.* p. 3.

* *Observations*, obs. 58.

† *Operations de Dionis*, edit. 5, p. 324, note a.

NAUD* confirm this statement by their own experience. The difficulty of accounting for this fact, when the universal adhesion of the sac to the surrounding parts is considered, particularly when the neck of the cavity is thickened; and the still greater difficulty of allowing that a large tumour, (for that of LE DRAN was a considerable one,) could be thrust under the crural arch, led Mr. LOUIS †to consider the whole affair as fabulous. RICHTER has espoused the defence of LE DRAN with considerable warmth; both in a separate publication‡, and in his large work on herniæ§. I have never seen nor heard of such an occurrence: it seems, indeed, to me, to be nearly impossible. At all events, it must be so extremely rare, as hardly to deserve to be taken into a general view of the subject.

* *Tr. des Hernies*, t. 1. p. 96.

† *Mem. de l'Acad. de Chir.* t. 4, p. 299.

‡ *Programma, in quo demonstratur, herniam incarceratam una cum sacco suo reponi per annulum abdominalem posse, contra chirurgum gallum clar.* LOUIS.

§ Chap. 15.

Section III.

Blood-letting.

The use of blood-letting in strangulated hernia has been very freely adopted, and warmly recommended by the most celebrated modern surgeons. The grounds of this practice are derived from the state of inflammation which occurs sooner or later in the prolapsed parts, and which is propagated from that source over the whole abdomen. Besides its effects in curing and preventing inflammation, the state of faintness, which it produces, is said to be peculiarly favourable to reduction. Mr. Pott*, in this country, has been the most strenuous advocate of venesection, and the high estimation in which his writings are most deservedly held has, no

* "Perhaps there is no disease affecting the human body, in which bleeding is found more immediately and eminently serviceable than in this; and which, therefore, if there are no particular circumstances in the constitution prohibiting it, ought never to be omitted; but, on the contrary, should be freely and largely repeated, if it appears at all necessary." Pott's *Works*, vol. 2, p. 79. Sharp's advice on this subject is just the same. *Treatise on the Operations*, edit. 10, p. 17.

doubt, been a chief cause of its very general employment. RICHTER* and CALLISEN,† the authors of the most approved continental systems of surgery, have been no less forward in recommending the free and almost indiscriminate use of the lancet in this complaint. Yet the authority of these great names has not gained universal assent to their opinions. Some eminent surgeons of this country have not only doubted the utility of venesection in strangulated hernia, but have published opinions most decidedly adverse to the practice. Mr. WILMER‡ of Coventry, and Mr. ALANSON of Liverpool, consider bleeding as completely inefficacious in forwarding the reduc-

* "Aussitôt que la hernie est douleureuse, il faut saigner, " de quelque espéce que soit l'étranglement."

RICHTER, *Traité des Hernies*, p. 93.

† " Præcipuus vero cardo vertitur in sanguinis detrac- " tione; quæ non solum inflammationi obstat, et inde eo " magis necessaria est, quo distinctiora phlogoseos sympto- " mata adsunt, sed quoque ob citam, quam inducit, debili- " tatem, reductioni favet."—CALLISEN, *Syst. Chir. Hodiern. pars poster.* § 707.

‡ See his *Practical Observations on Hernia, illustrated with Cases*," ed. 2nd. He says, on the employment of Bloodletting in strangulated hernia, " I have seen it often tried, but " never with any success."—p. 18. Mr. ALANSON, in a letter contained in the same work, expresses his opinion, " that " bleeding is never of the smallest service in forwarding re- " duction."—Ibid, p. 29.

tion: the weight of Mr. Cooper's* experience has been added on the same side of the question.

The degree, in which any particular mode of treatment can contribute to liberate the contents of a strangulated hernia from stricture, is the fair criterion by which its merits should be estimated. An examination of blood-letting, according to this rule, will not lead us to place that confidence in its powers, to which the strong recommendation of Pott, of Richter, and of Callisen would otherwise have entitled it. Venesection cannot enlarge the opening through which the hernial contents have descended; it cannot diminish the bulk of the prolapsed parts; nor has it the power of exciting any action of the viscera, which might extricate them from the stricture: yet, if it were found actually beneficial in practice, these theoretical objections might be justly disregarded; but it has gradually fallen into comparative disuse among the practitioners of this metropolis, from the experience of its frequent inefficacy. A means of such powerful operation as blood-letting, if useless, can hardly escape the suspicion of being injurious; and such, no doubt, it must be, when indiscriminately employed in the treatment of strangulated hernia.

* *Anatomy &c. of Inguinal Hernia*, p. 29.

I would have it understood that this observation applies to the indiscriminate employment of large and repeated bleedings. As patients, who die after the operation, have generally appearances of inflammation in the abdominal contents, I am aware that a judicious use of venesection, if it does not contribute to the return of the parts, cannot be injurious on the principles abovementioned. I think that the advocates and opponents of blood-letting have stated their opinions too strongly on the opposite sides of the question, and that a prudent practitioner will take a middle course between these two extremes. He will not with POTT use venesection in all instances, neither will he follow Mr. WILMER in discarding it entirely from the treatment of hernia, but will restrict its employment to a certain class of cases.

He will have recourse to it when the strangulation is of the inflammatory kind; when the hernia is small and recent; the abdomen tense and painful; and the patient young, strong, and plethoric. Two cases are related in the excellent Practical Observations of Mr. HEY*, which will serve to shew under what circumstances venesection is allowable. The experience of this judicious practitioner leads him to concur with

* P. 124.

Messrs. WILMER and ALANSON in declaring, that blood-letting has generally failed to procure the return of a strangulated intestine, although he does not agree with them in their universal reprobation of its employment.

One advantage is certainly derived from venesection, although it should prove inadequate to the intended object of its employment; viz. that, by checking inflammation, it keeps the disorder stationary, and is therefore attended with no loss of time.

It is hardly necessary for me to observe, that the conduct of the surgeon cannot be regulated in these cases by the state of the pulse; the pain and tension, and other symptoms will justify him in employing or repeating this evacuation, where the pulse is weak, and not beyond its natural frequency. Neither should he be deterred from using the lancet by coldness of the extremities, pale countenance, and weak respiration: since these are ordinary symptoms of inflamed bowels: and the experienced surgeon knows that venesection will raise the pulse, restore warmth to the limbs, and apparently strengthen the patient.

In order to obtain all the advantage, which can be derived from blood letting, we are directed to continue it until fainting is produced; and to attempt reduction at that time. This precept must be received with some allowance. Syncope

is not easily produced in some individuals; and the general condition of the subject must be regarded. A small bleeding, however, can do no good, even if repeated. The blood should be drawn rapidly from a large opening, and in considerable quantity; due regard being paid to the age and strength of the patient, and the species of strangulation. If syncope occurs, we may take advantage of it for attempting reduction.

Section IV.

The Warm Bath.

The Warm Bath is used with views partly analogous to those, which guide the practitioner in the employment of venesection: it induces a state of faintness and relaxation, under which reduction may be attempted with advantage. The weakness produced by this remedy is temporary, and is not attended with any subsequent debility. The use of opium may be advantageously combined with it, if the symptoms of irritation are strong. After the taxis has been unsuccessfully employed, the patient should be placed in the warm bath, if possible, in the recumbent

position: when faintness comes on, the attempts at reduction may be renewed in the bath.

The warm bath may be used in the early stages of the complaint, when the symptoms are not yet very urgent. If the strangulation has lasted for some time, so that the circumstances require dispatch; if it has resisted more powerful means, such as the topical application of cold and the tobacco clyster, it would be mere waste of time to employ this remedy; when indeed the strangulation is completely formed, the warm bath offers but a slight chance of producing the return of the parts.

Section V.

Purgatives.

Purgative medicines have been recommended with the view of exciting the peristaltic action of the intestine, and thereby extricating it from the stricture. Experience has taught us to repose very little confidence in these remedies: they are not only inefficacious, but actually prejudicial in the inflammatory strangulation. They are either immediately rejected on reaching the stomach; or, if they pass into the intestines, increase the ir-

ritation under which the parts already labour. Hence the most approved surgical writers* of the present day prohibit their employment in cases of that description. In old and large herniæ, where an accumulation of fecal matter, from torpor of the intestine, is the cause of strangulation, and the symptoms are of the chronic kind, purgatives may be employed with success. If vomiting has already appeared, it may be allayed by opium and the effervescing draught, so as to allow a fair trial of the purgative. The most violent remedies of this description are not always the best in such a case. Epsom salt, dissolved in a large quantity of water, and exhibited in small and repeated doses, gently excites the action of the parts, and is preferable to the more drastic purges.

Opium may be combined with this remedy, to make it sit better on the stomach. Richter† commends the combined employment of purgatives and opium, and praises highly, from his own experience, the following formula. Melt an ounce of Epsom salt in five ounces of infusion of camomile flowers; add two ounces of linseed

* Pott's *Works*, vol. II. p. 82.—Richter *Traité des Hernies*, p. 89.—Hey's *Practical Obs.* p. 128.—Wilmer, *Practical Obs.* p. 36.

† *Traité des Hernies*, p. 82.

oil, one ounce of lemon juice, one ounce of the syrup of red poppies, and two grains of purified opium: shake them well together, and give a spoonful every quarter of an hour, until it operates.

Purgatives are no longer serviceable, when inflammation has come on, even in those cases, where their employment was proper in the first instance.

An omental hernia is another exception to the general doctrine on the subject of purgatives. If we can clear the intestines completely, the operation will be seldom necessary: bleeding, the warm bath, and fomentations to the abdomen may be usefully combined in this case, with such means as will evacuate the bowels.

As the tendency to sickness may render it advisable, in such a case, to exhibit the purgative in the form of pills, the union of calomel and the cathartic extract* is well adapted for the pur-

* Dr. HEBERDEN considers the cathartic extract and vitriolated magnesia to be the best purgatives in cases of ileus. He directs half a dram of the former to be made into five pills, with the addition of a grain or a grain and a half of opium: these are to be taken one at a time. If the vitriolated magnesia be employed, a dram of it should be dissolved in an ounce of water, weak broth, or gruel, and taken every half hour.

Medical Transactions, v. 2. p. 516.

pose: for the same reason, a combination of opium with these medicines may be serviceable.

Purgatives, in the form of clysters, do not seem more efficacious than the same remedies taken by the mouth: if the intestine below the stricture has not been already emptied, (which, however, it generally is, soon after the strangulation is formed) clysters will bring away its contents. Their exhibition in this form is not liable to the same objection, which rendered it improper to administer them by the mouth; viz. the increased irritation which they occasion. In cases, where purgatives are proper, clysters may be combined with them.

Section VI.

Tobacco Clyster.

Clysters of tobacco constitute our most powerful and certain means of relieving incarcerated hernia, independently of the operation; and general experience has so clearly shewn their efficacy, that the knife is rarely, if ever, resorted to in the present day, without a previous trial of this remedy. Yet it is not invariably successful; we can by no means assent to the observation of

HEISTER*, that the use of tobacco renders the operation in all cases unnecessary. It may be employed in the form of infusion, or of smoke: in the former case, one dram† of the herb having been boiled for ten minutes in a pint of water, the strained liquor should be injected. The smoke is impelled into the rectum from the well-known apparatus consisting of a bellows, long pipe, &c. The effects on the patient appear to be nearly the same in both instances, and our present experience does not warrant us in ascribing a preference to either form of the remedy‡.

* "Posteaque adhuc aliquot ejusmodi ægros hoc fumo "tabaci felicitér restitui ut nunquam adhuc hoc in morbo ad "scalpellum accedere opus mihi fuerit." *Instit. Chirurg.* p. 807.

† One dram of tobacco, boiled or infused in a pint of water, is the quantity generally recommended by English practitioners.—POTT's *Works*, vol. III. p. 276. HEY's *Practical Obs.* p. 140. COOPER, *Anat. &c. of Ing. Hern.* p. 24. HEBERDEN's *Commentaries*, p. 270. And this is generally found sufficient to produce the desired effect. The cases quoted below from Mr. COOPER should render us cautious in exceeding this proportion: RICHTER, however, orders an ounce of tobacco to the same quantity of water.—*Anfangsgründeder Wundarzneykunst*, vol. V. p. 264. Can this difference be accounted for by the habit of smoking, which is universally prevalent in Germany?

‡ Mr. HEY prefers the decoction, without mentioning the grounds of his preference, p. 140. POTT and RICHTER seem to think the smoke preferable. The former states, that the

The beneficial effects of tobacco do not depend on its purgative power, as I have already stated that purging clysters are nearly inefficacious. It not only excites the action of the intestines, but exerts a peculiar depressing influence on the system at large; it reduces the pulse, and brings on nausea and sickness, cold sweats and fainting, under which circumstances the parts recede spontaneously, or may be returned by the slightest pressure. Its use should be continued until these effects are produced; the quantity required for this purpose varies considerably in different persons. Mr. Cooper has seen two drams, and even one dram, employed in the form of infusion, prove fatal to the patient*. In other cases, two ounces have been consumed in the smoke apparatus before the necessary effect was

smoke does not operate so powerfully on the nervous system as the decoction. The administration of the smoke is often attended with considerable trouble and inconvenience from the apparatus being damp, or out of order, so that the decoction has grown into more general use: and it must be allowed that this is the most certain way of employing the remedy. Yet I think that the smoke can be employed to a greater extent, without fear of the consequences, than the the decoction: and this is an important point, since the remedy often fails from not being continued long enough.

* *Anatomy, &c. of Ing. Hernia*, p. 24. The smoke seems to have been fatal in a case observed by Dessault; *Œuvres*, 2, p. 344.

produced, and the case terminated favourably*. I have seen two drams of the decoction used, and two-thirds of an ounce entirely consumed in smoke in the same patient, who was fifty years of age, with the production of very slight effect: I afterwards operated in this case with complete success.

The tobacco has sometimes been successful in the extremest cases; a rupture was reduced by this remedy under Mr. POTT's† direction, when every other means had failed, and the patient had been placed on the table for the operation. Similar instances of its efficacy are related by the same author. I think it worth while to add to the testimony already before the public, the following proofs of its great powers; previously observing, that I do this merely to shew what the remedy is capable of effecting, and not for the purpose of exhibiting models of the conduct, which a surgeon should pursue in such instances.

CASE I.

ALL the usual means had been employed ineffectually, in a strangulated scrotal rupture, for

* POTT's *Works*, vol. III. p. 277.

† Ibid.

the space of five days. The tobacco smoke was resorted to; and, after persevering in its use for a considerable time, the tumour subsided spontaneously.

CASE II.

In another case, where the strangulation had lasted for a week, and the feeble pulse, fecal vomiting, pallid countenance, and oppressed breathing indicated the greatest danger, the tobacco produced its beneficial effect, and the patient recovered.

CASE III.

In one instance, where the smoke was ultimately successful, its effect on the system at first was nearly fatal. The strangulation had existed for three days, in which time purgatives and clysters, large bleedings, and cold applications had been ineffectually employed. The administration of the tobacco produced such a state of tremor and faintness as to make the attendants think the patient was dying. The pulse sunk so as to be scarcely perceptible; and the countenance bore marks of approaching dissolution;

under these circumstances the stricture gave way, the parts returned, and the nervous system soon recovered from the effects of the remedy.

I shall conclude my observations on this part of the subject, by stating that the tobacco, like every other means, has often failed; but that no other remedy has been so frequently successful: and that, when this has appeared, on a fair trial, to be incapable of accomplishing our object, the only resource lies in an immediate performance of the operation.

Section VII.

Antispasmodics,

The utility of antispasmodics in strangulated hernia is much insisted on by Richter*: he includes under this denomination the warm bath, emollient fomentations to the abdomen, opium, ipecacuanha in small doses, &c. Opium, indeed, has been often recommended, and many cases might be collected, where it should seem to have

* *Anfangsgründe der Wundarzneykunst,* vol. V. § 322—329.

promoted the return of the prolapsed parts; but general experience does not warrant any great reliance on this remedy. It possesses, according to Mr. Hey's* observations, the power of suspending the pain and vomiting, even where it proves ultimately inefficacious. It may therefore be an useful auxiliary, under certain circumstances, although it cannot be considered as a primary means of accomplishing our object.

Dr. Heberden† speaks very highly of the use of opiates, in cases of ileus, from his own experience. The advantages derived from such remedies, according to this writer, are, that they enable the stomach to bear stronger and more repeated doses of purgatives, obviate the want of sleep, and suspend the distressing anxiety and restlessness. Even if the case should be desperate, they will alleviate the sufferings of the patient, and tranquillize the last moments of that existence which they cannot prolong.

On the use of ipecacuanha, and other antispasmodics, my own experience does not enable me to decide. I should not expect any benefit from their employment. When I am informed that the return of a hernia has been effected by means apparently so inadequate as the exhibition

* *Practical Observations*, p. 134, and Case, p. 129.

† *Commentaries*, p. 272.

of two grains of opium and castoreum*, I cannot help suspecting that reduction might have been accomplished without the aid of these medicines. Not content with employing ipecacuanha in nauseating doses, RICHTER actually speaks of giving it in such quantity as to occasion vomiting. I am exceedingly surprised to meet with such a proposal from a person of RICHTER's good sense and great experience. Surely, if vomiting is to effect the return of a strangulated hernia, we may leave the case to nature: this symptom appears speedily enough without the use of emetics.

SECTION VIII.

Cold Bath, and cold Applications.

THE cold bath, and the dashing of cold water on the patient, although, perhaps, successful in a few cases†, have never produced very

* RICHTER *Traité des Hernies*, p. 52.

† PETIT mentions a case, in which, after the regular and unsuccessful employment of the usual means of art, he had resolved on the operation, and was on the point of making his first incision, when he was stopped by the arrival of the patient's grandmother, who commanded him to desist. She had

decided benefit, nor been attended by such general good effect as to warrant their recommendation.

The application of cold to the hernia is entitled to more attention*. This may be accomplished by pounded ice, tied up in a bladder, and placed on the rupture. A solution of sal ammoniac, or of other salts, in cold water, may be employed in the same manner. The application of folded cloths dipped in iced water, and frequently renewed; and the evaporation of ether† upon the part, are other means of accomplishing the same object. We should persist in the trial for some hours‡, in order to give it a fair chance: yet caution must be observed on

the patient placed on a blanket, and ordered a bucket of cold well water to be dashed on the thighs and abdomen; and the hernia returned almost immediately.—*Tr. des Mal, Chir.* t. 2, p. 325.

* Mr. WILMER has been very strenuous in recommending this practice, and has related several cases of its successful employment.—See the second edition of his Tract, London, 8vo. 1802.

† Instances of the efficacy of this treatment are related in *Duncan's Commentaries*, vol. 17, p. 487; and vol. 18. p. 443. See also SCHMALZ in LODER *Journal für Chirurgie*, b. 1, p. 681.

‡ If no benefit is derived in the course of four hours, we need not expect success from the further prosecution of the cold application.

this point; for the scrotum has been frozen by the long continued application of ice*.

The topical application of cold is one of our most powerful means of treating strangulated hernia, and is to be considered as second only to the tobacco. We cannot explain very satisfactorily the exact manner in which this remedy operates. It is supposed, by causing a constriction or corrugation of the integuments and external parts, to create a general pressure on the surface of the prolapsed viscera. At the same time, by diminishing the inflammatory disorder, it will reduce the bulk of the parts, and these two effects concur in promoting the reduction. As the sensibility of the swelling is lessened, by the operation of the cold, the parts may afterwards be handled with less pain. It may be combined with the use of the tobacco.

Section IX.

Warm Applications.

Poultices, and fomentations, both to the swelling, and abdomen, were formerly very gene-

* Cooper, pt. 1, p, 25.

rally employed in the treatment of strangulated hernia; but repeated experience has so fully demonstrated their inefficacy, that no practitioner of the present day would place the least confidence in them. The constant progression of these cases from bad to worse renders it necessary that effectual means should be resorted to in an early stage of the complaint: hence, any mode of treatment, which in itself may be harmless, becomes, from the loss of time which it occasions, positively prejudicial.

Section X.

General Observations.

It may be expected, that these observations on the various modes of treating strangulated hernia, should be applied to cases as they actually occur; but this must be done by the surgeon in his practice. He should endeavour to ascertain the cause and species of the incarceration; and he must exert his own judgment in the selection of his means, and their adaptation to the circumstances of the case. If he is called in the early state of the complaint, and the taxis has

been unsuccessful, warm bathing and blood-letting, where the circumstances admit of it, will be the first means for him to employ. I should not, however, be inclined to recommend the warm bath, unless it can be prepared expeditiously.

Cold applications to the tumour hold the next rank in the list of remedies. Should these be unsuccessful, he will give a fair trial, with as little delay as possible, to the tobacco; and, in the event of its failure, immediately operate.

A surgeon, whose opinion, from his vast experience, and disinterested zeal for the improvement of his profession, is entitled to our greatest attention, has questioned the propriety of commencing operations in all cases of strangulated hernia, by attempts at manual reduction. "If," says DESAULT*, "the strangulation is slight, the warm bath, with a proper position of the body, and emollient applications, will bring about the return of the intestines by their relaxing effects. Some cases might, no doubt, be more promptly relieved by the taxis; but we must place against these all the instances in which our efforts, by increasing inflammation and swelling, are not only useless but injurious. Should the strangulation be more considerable, and require a proportionably greater force, the danger will be aug-

* *Œuvres Chirurg.* t. 2, sect 4.

mented in the same ratio. The failure of these exertions leaves the operation as the last resource; but do not expect it to be successful: the injury already done to the parts is an alarming source of danger." On this circumstance DESAULT always founded his prognostic, which was generally correct. "Think favourably (said he) of a hernia which has not been handled before the operation." A rule should, therefore, be established in conformity with these principles, to abstain from the taxis at the beginning of strangulation, and to employ relaxants. When these have produced an alteration in the tumour, gentle attempts at reduction will complete the business. The treatment of strangulated herniæ was conducted at the Hotel Dieu, in compliance with these notions. The patient was placed in the warm bath, immediately on his arrival; with his trunk in the same position as is employed for promoting the return of the parts in the taxis. He was left there as long as he could bear it; perhaps for one or two hours. An emollient cataplasm was afterwards placed on the tumour, and clysters were injected. The bath was used three times in the day. When the inflammatory symptoms were considerable, venesection was combined with this treatment.

These remarks are particularly applied to

the inflammatory strangulation: although they do not precisely accord with the usual practice of this country, it will probably be allowed, that they are not entirely unsupported by reason; and they are deduced, according to the representation of BICHAT, from the result of all DESAULT's experience. They who are not disposed to adopt, in its full extent, the opinion and practice of the French surgeon, will probably coincide with him so far as to allow, that the infliction of considerable violence on organs, which by their construction, are prone to inflammatory action, and, in their natural situation, are completely protected from external injury, may be injurious; that such treatment is more likely to be hurtful, when these organs are actually inflamed: and at all events, that the rude handling of a rupture by five or six persons in succession, can do no good, but may possibly be very mischievous.

The employment of venesection, clysters, and purgatives, if the stomach will bear the last-mentioned remedies, will generally relieve the distressing symptoms of an epiplocele, and preclude the necessity of having recourse to the operation. The application of leeches to the tumour affords a prospect of benefit in this case.

When, as it very frequently happens, the aid of the surgeon is not required, until the com-

plaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to; as circumstances will not admit of delay in the previous use of less powerful remedies. His own discernment must be trusted for adapting his means and conduct to the different circumstances of an inflammatory and a chronic case. The use of purgatives and clysters, which are beneficial in the latter, do not afford a chance of success in cases of the former description. They should never be employed, unless the slow progress of the case clearly shews that the danger is not urgent.

I wish to impress the surgeon with the propriety of giving, without delay, an adequate trial to the most powerful means which the art affords, and of performing the operation as soon as it can be clearly perceived that these are unsuccessful*. There is no reason to expect that a less active remedy will succeed, when a more potent one has failed. The chance of reducing a rupture is lessened in proportion to the duration

* "In universum notandum, remedia incarcerationi opitulantia, cito et strenué adhibenda esse, cum natura hic parum aut nihil faciat, et omnis ægroti salus ab artis auxiliis petenda sit: omnis mora, omnisque tardior aut negligentior remediorum usus, semper damnosus, sæpissime exitialis erit."—CALLISEN, *pars poster*, p. 464.

of the complaint: the prolapsed parts becoming more inflamed, are more closely pressed by the stricture, and soon fall into a state, where attempts at reduction by the hand are inadmissible.

The danger to which the patient is exposed by the operation, is less than that which he undergoes by delay. In the latter case, inflammation and gangrene of the part, with similar affections of the other viscera, and the highest degree of sympathetic constitutional irritation, are surely produced by a continuance of the incarceration. In this state the operation is performed under the greatest disadvantage, as the local and general disorder both threaten a fatal termination. If

* This argument has been so clearly and forcibly stated by Richter, that the reader will not be displeased at my inserting the following extract from a paper of his in the Göttingen Commentaries :—"Quando mitiora remedia sedulo et dextere, ast incassum adhibita sunt, differenda non amplius est operatio. Quid enim spei superest, ut quod primo die non præstiterint, id præstent postero? Increscit omni momento vehementia morbi, increscit vis illa, quæ constringit partes prolapsas, increscit difficultas medelæ, ut itaque, quæ initio morbi, ubi facilior curatu morbus erat, nil profuerunt remedia, certe sub progressu morbi jam curatu difficilioris nil proderunt; superest hic operatio tanquam unicum remedium, quod, ut jam differatur, nil est, quod suadet, cum ab hoc solo salus expectanda sit, cum increscat omni momento periculum vitæ." *Novi Commentarii*, t. 6, p. 63.

we operate while the parts are uninflamed, the risk of the operation only is endured.*

Our conduct must not be guided merely by the duration of the case; the kind of strangulation, the nature of the symptoms, the effect of the means employed, and the state of the parts, must influence our determination. Small and recent herniæ, or such as, having been kept up for a long time by means of a truss, are suddenly reproduced, admit of very little delay. The strangulation is violent in such instances; and inflammation and gangrene soon come on. In old and large ruptures, which have been often down, and often replaced, the symptoms are not so urgent, nor the necessity of operating so pressing†.

We grant, that the event of the operation, under any circumstances, is uncertain: but the unfortunate termination, which so frequently at-

* "Certum hujus operationis periculum de nimiâ operationis dilatione pendet, si ægroti jam viribus exhausti partes elapsæ gravissima phlogosi, in gangrænam prona correptæ, et morbus ad reliqua contenta abdominis propagatus fuerit." CALLISEN, *pars poster*, p, 478.

† I have mentioned some instances already, (note in chapter 1, section 5,) where strangulated hernia proved fatal within one day. LE DRAN has related a case in which the operation was performed on the seventeenth day, and the parts were not much affected.——Obs. 57.

tends it, must be ascribed, in the majority of cases, to its being delayed, until the state of the protruded parts, or of the patient's general system, is such, as to leave little chance of success.

It is hardly necessary, in the present day, to combat the opinion, that any time previous to the actual occurrence of gangrene, is early enough for the operation. Inflammation, when it has proceeded to a vehement degree, will certainly end in gangrene; and persons have often died of incarcerated hernia, without the complaint proceeding to the termination in mortification.

The danger of delay has appeared so clearly to the best writers on the subject, that they have taken great pains in inculcating the necessity of an early recourse to the operation. The most celebrated practitioners on the Continent agree on this point with the great surgeons of our own country; and the dangerous and fatal effects of delay are strongly represented in many parts of their writings*. Several extracts from works of the highest authority might be adduced in support of this assertion: but I shall content myself with

* See POTT's *Works*, vol. 3, p. 286. BERTRANDI, *Traite des Operations*, p. 21. WILMER, *Pract. Obs. on Hernia*, p. 75. RICHTER, *Tr. des Hernies*, p. 105 and 106. CALLISEN, *Syst. Chir. Hod. pars poster.* p. 473. COOPER, *Anat. &c. of Inguinal Hernia*, p. 26.

a quotation from the Practical Observations* of Mr. Hey: this is particularly valuable, as it exhibits a comparative view of the event of the operation, when performed at a proper time, and when improperly delayed. When this gentleman first began practice, he considered the operation as the last resource, and only to be employed when the danger appeared imminent. "By this "dilatory mode of practice," says he, "I lost "three patients in five, upon whom the opera- "tion was performed. Having more experience "of the urgency of the disease, I made it my "custom, when called to a patient, who had la- "boured two or three days under the disease, to "wait only about two hours, that I might try "the effect of bleeding, (if that evacuation was "not forbidden by some peculiar circumstances "of the case) and the tobacco clyster. In this "mode of practice I lost about two patients in "nine, upon whom I operated. This compa- "rison is drawn from cases nearly similar, leav- "ing out of the account those cases, in which "gangrene of the intestine had taken place. I "have now, at the time of writing this, perform- "ed the operation thirty-five times; and have "often had occasion to lament that I performed

* Page 143.

" it too late, but never that I had performed it " too soon."

We may state, therefore, as the general inference, from what has been now advanced, that a person can only be rescued from that danger, to which he is exposed by a strangulated rupture, by the efforts of art: that the constant and generally rapid progression of such cases from bad to worse, renders it necessary that the surgeon lose no time in giving a fair trial to the most powerful means, in order that, if these are inefficacious, the operation may be performed before the prolapsed parts have become inflamed and painful: that an operation, done under such circumstances, has every chance of success: but that if symptoms denote inflammation or gangrene of the part, the chances of a favourable event are much lessened, although the indication is still more urgent*.

* A most singular opinion respecting the operation for strangulated hernia, has received the sanction of the celebrated HEBERDEN; and I am induced to notice it here, by the weight which a name so much respected might otherwise give to a line of conduct leading inevitably to the most fatal consequences. He regards the use of the knife as rarely, if ever, advisable; and professes himself altogether at a loss for rules of judging what cases are proper for the operation, and at what time it should be resorted to. See his *Commentaries*, p. 273. It will not, I should apprehend, be necessary, after the fore-

I shall describe the operation, when speaking of the inguinal hernia; and the account then given will apply also to the other species, except in particular points which will be noticed afterwards.

going observations, to accompany this statement with any comment. I shall only place by the side of it the sentiments of a writer not less experienced than Dr. H. and whose opinion on a surgical subject will claim at least equal authority. "Grave "illud periculum quod hernia parit incarcerata, certo præsen- "tissimoque chirurgia tollit remedio, operatione scilicet illa, "quæ herniotomia vocatur." RICHTER, *in Comm. Goett.* t. 5, p. 56.

CHAP. IX.

ANATOMY OF INGUINAL RUPTURES.

IT is right to preface the account of inguinal hernia with a description of the parts concerned, since an exact knowledge of these will throw much light on the subject; and will be particularly useful in performing the surgical operation which is required for its cure. Here, indeed, as in many other instances, a surgeon may get through his business without anatomical knowledge; but he cannot operate with satisfaction to himself, nor without danger to the patient; as he must be immediately perplexed by the occurrence of any circumstance out of the usual course. Hence we cannot be surprised to find that he puts off the operation to the last moment, and, with the hopes of escaping from the performance of what he dreads, wastes that time which ought to be occupied in the operation, in the repetition of trials already found unavailing. The kind of knowledge, which I allude to, would be sought

in vain in the most approved writers on hernia: for anatomy has hitherto been very little studied in reference to its connexion with surgery. I cannot therefore mean to cast any reflection on those men, whose writings have extended and improved the latter art, when I state, that their works shew an ignorance of this subject: the fault does not rest with them individually, but belongs to the time in which they lived. A few observations on particular points lie scattered in the works of different writers; but no complete description, and accurate delineation of the anatomy of inguinal hernia existed previously to the late excellent works of CAMPER* and Mr. COOPER.

* *Icones Herniarum Editæ a* S. T. SOEMMERRING, 1801. These plates represent several important points in the anatomy of inguinal hernia, in that accurate and expressive style of delineation, which was peculiar to CAMPER. It must be observed, that, although they were not published till after the author's death, they had been engraved as early as the year 1757.

Section I.

Anatomical Description of the Openings through which Inguinal Ruptures take place.

The aponeurotic expansion, which constitutes the tendon of the external oblique muscle of the abdomen, besides its connexion to the whole length of the linea alba, is attached to the anterior superior spinous process of the ilium, and to the upper part of the pubes. Its lower margin, which is rather thickened and stretched between these two points, is best known by the name of Poupart's or Fallopius's ligament, and is now very commonly described under the term of the crural arch.* As the fibres of the aponeurosis pass obliquely downwards and forwards, they separate into two distinct portions, which constitute the pillars or columns of the abdominal ring. The upper and inner of these is fixed to the symphysis pubis: the lower and outer (which is indeed the above-named ligament of Poupart)

* For further particulars concerning this part the reader is referred to the "Description of the parts in which the femoral rupture is situated." Chap. XIV. Sect. 1.

is attached to the spine and crista of the bone. The separation of these tendinous columns leaves a triangular space, called the abdominal ring, or ring of the external oblique muscle. The os pubis constitutes the base of the triangle; the two pillars form its sides; and the apex is the part at which these separate from each other. It is not, however pointed; since some transverse fibres, which connect the two columns together, round off this upper part of the opening: these are found particularly strong in an old hernia. The abdominal ring is directed obliquely upwards and outwards; the upper part of it pointing towards the spine of the ilium: this part is often mentioned by the name of the *external angle* of the ring. The base of the triangle is situated downwards and inwards with respect to the apex; and the two sides, of which one is external and the other internal, are continued from the apex obliquely downwards and inwards to the basis.*

The aponeurosis of the internal oblique muscle is separated through its greater part into two layers, of which the anterior and thicker joins

* If we employ the new terms of Dr. Barclay, the apex of the ring is atlanto-lateral; the basis sacro-mesial, the internal side is mesial, and the external lateral; the atlantal ends of these two sides are lateral, and their sacral ends mesial.

the tendon of the external oblique, the posterior and thinner is attached to that of the transversus; but the lower portion of this tendon, together with the corresponding part of the transversus, goes wholly in front of the rectus muscle. The lower margin of these two muscles (the obliquus internus and transversus), which arises from about the upper half of Poupart's ligament, is found behind or within the outer column of the abdominal ring, and is fixed in the pubes behind the ring.*

A thin fascia is extended from the inner or posterior margin of Poupart's ligament behind the transversus, on the surface of which it is gradually lost. By this the ring of the external oblique is closed towards the abdomen; and but for this there would be a direct opening into the cavity of the belly behind that ring.† The fascia

* The attachment of the transversus to the pubes is noticed by WINSLOW, Sect. 3, § 111, and by GUNZ, *Obs. Anat. Chir. de Herniis*, p, 18.

† It has been hitherto an almost universally received opinion, that the abdominal ring is covered by peritoneum only at its posterior surface; and consequently that the contents of a rupture are protruded directly from the abdominal cavity. Were this a correct representation, inguinal hernia would be much more frequent than it actually is. The following quotation from RICHTER will shew the opinion generally held on this subject. After describing the aperture in the tendon of the obliquus externus, he proceeds thus; "Derriere

which we are now describing, consists of a very thin and delicate expansion. Mr. Cooper, who first noticed it, and who has bestowed on it the name of *fascia transversalis*, has rightly observed, that in some subjects it appears only as condensed cellular membrane.* If, after carefully removing the transversus, we press with the finger above Poupart's ligament, we shall experience a greater resistance than the unsupported peritoneum could offer; and this arises from the fascia in question.

Yet it often has a very distinct tendinous structure near the front of its attachment to the crural arch. If we trace it from this part upwards, we shall find it divided immediately into two portions, an internal and external; which leave between them a considerable interval, just in the middle of the crural arch. The former of these is connected by its inner edge to the outer margin of the rectus abdominis, and to the infe-

" cette fente uniquement remplie par du Tissu cellulaire et " par les parties mentionnées est placé le Péritoine, qui n'est " recouvert par aucun muscle, et qui doit non seulement " résister à la force distendante, mais encore au poids des " visceres de l'abdomen. Cet endroit est ainsi naturellement " trés foible, et facilite d'autant plus la formation des hernies, " qu'il est placé en bas." p. 15.

* P. 6.

rior margin of the tendon of the obliquus internus and transversus; and both are gradually lost above, between the peritoneum and transversus. The posterior surface of this aponeurosis is lined by the peritoneum.

Since this fascia is situated behind the obliquus internus and transversus muscles, the division just described is covered by these muscles, except in the immediate neighbourhood of the crural arch, where a small part of it appears under their lower margin. This opening gives passage to the spermatic chord and to the round ligament of the uterus; and was first described by Mr. Cooper, in his work on inguinal and congenital hernia. The superior margin of this aperture is formed by the lower edge of the obliquus internus and transversus: which can be felt very distinctly by the finger passed obliquely upwards and outwards through the ring of the external oblique muscle. The other sides of the opening, which are sometimes not very clearly defined, are formed by the fascia transversalis.

The spermatic vessels, placed behind the peritoneum, descend from the loins, over the surface of the iliacus internus muscle, connected to it and to the membrane by loose cellular substance; and arrive at the division between the two portions of the fascia transversalis. Here

they are joined by the vas deferens: and the spermatic chord, which results from this junction, passes through the opening, and consequently under the margins of the obliquus internus and transversus.* It then goes obliquely downwards and forwards, between the fascia and the aponeurosis of the external oblique,† being increased in size by the addition of a few thin muscular fibres, called the cremaster muscle, derived from the lower edge of the internal oblique, and from the crural arch. The chord finally emerges through the opening in the tendon of the obliquus externus, and then turns suddenly downwards; lying not so much on the bone between the two columns of the ring, as on the outer column itself, so as to cover its insertion into the pubes.

If, under the name of *abdominal ring*, we

* The part, at which the spermatic vessels leave the abdomen was first represented by CAMPER in his *Demonstrationes Anatomico-Pathologicæ*, published in 1760. The *Icones Herniarum* of the same author, which were engraved still earlier than this, represent the same circumstance.—WINSLOW also mentions this part, without describing it very minutely. Sect. 3, § 94.

† The passage of the spermatic chord through a canal, previous to its penetrating the ring of the external oblique, is expressly stated by GIMBERNAT in his *Account of a New Method of operating for Femoral hernia*, p. 19 and 32.

include the whole passage of the spermatic chord through the abdominal parietes, we must describe it as a canal, and not as a simple opening. The upper or inner aperture is rather nearer to the pubes than to the ilium*; the lower, or outer opening, is the abdominal ring; and the canal itself extends obliquely between these points, being closed in front by the aponeurosis of the ex-

* It is not, perhaps, necessary, that the practical surgeon should be minutely acquainted with the exact measurement of the distances of these parts: yet I think it right to make one or two remarks on the subject, as some incorrect representations have been given to the public. In "*The Anatomy and Surgical Treatment of Inguinal and Congenital Hernia,*" it is stated, that the distance from the anterior superior spine of the ilium to the symphisis pubes, is six inches, and that the inner margin of the upper opening of the abdominal ring, is exactly in the mid space between them. The average measurement between these two points, is about five inches and a half, and six inches is the greatest distance that we ever meet with; yet, in the first plate of this book, the space between the letters *a*, and *b*, which denote the two above-named points, is no less than six inches and a half, and in the second plate, it is actually seven inches and a half; both of which dimensions far exceed those of any human subject: these, of course, are the errors of the draftsman. The inner opening of the ring has appeared to me to be nearer to the pubes than Mr. Cooper represents it.

I subjoin the statement of the exact measures of these parts, as given by Mr. Cooper, in the second part of his work on hernia, lately published.

ternal oblique, and behind by the fascia transversalis*.

	IN THE MALE SUBJECT. inches.	FEMALE. inches.
From the symphysis pubis to the anterior superior spine of the ilium	$5\frac{3}{4}$	6
..... tuberosity of the pubes	$1\frac{1}{8}$	$1\frac{3}{8}$
..... inner margin of the lower opening of the abdominal canal	$0\frac{7}{8}$	1
..... inner edge of the upper opening	3	$3\frac{1}{4}$
..... middle of the iliac artery	$3\frac{1}{8}$	$3\frac{3}{8}$
..... vein	$2\frac{5}{8}$	$2\frac{3}{4}$
..... origin of the epigastric artery	3	$3\frac{1}{4}$
..... course of the epigastric artery on the inner side of the upper opening	$2\frac{3}{4}$	$2\frac{7}{8}$
..... middle of the lunated edge of the fascia lata	$2\frac{3}{4}$	$3\frac{3}{4}$
From the anterior edge of the crural arch to the saphena major vein	1	$1\frac{1}{4}$
From the symphysis pubis to the middle of the crural ring	$2\frac{1}{4}$	$2\frac{3}{8}$

* The terms of Dr. BARCLAY would enable us to express more accurately the relative position of the two openings of the abdominal canal. The aperture in the tendon of the obliquus externus is sacral, mesial, and dermal; that of the fascia transversalis is atlantal, lateral, and central.

The epigastric artery, springing from the external iliac trunk, close to Poupart's ligament, goes behind the spermatic chord, just before that chord enters the abdominal canal. It runs obliquely upwards and inwards, on the surface of the peritoneum, precisely along the inner margin of the superior aperture of the ring, and then passes at the distance of half an inch, or an inch, from the upper extremity of the ring of the external oblique, in its course to the posterior surface of the rectus muscle. It is accompanied by one or two veins; in the former case the vein is between the artery and the pubes*.

* For the use of students I subjoin a short direction for the dissection of the parts described in this chapter. After exposing the tendon of the obliquus externus at its lower part, and particularly where it forms the crural arch, as well as at its double insertion into the pubes, let a transverse incision be made through it, beginning at the linea semilunaris, about an inch above the situation of the navel, and carried directly outwards. From the termination of this cut a perpendicular one should be extended to the crista of the ilium; and the obliquus externus should be separated from that part of the bone. The incision must now be continued through the tendon, parallel to the crural arch, and just above it as far as the lower opening of the abdominal canal, leaving that however, entire. By turning the flap, thus separated, over towards the linea alba, we gain a view of the spermatic chord passing between the two openings; of the inferior margin of the obliquus internus and transversus, which are here united into one, crossing over the chord to be fixed into the pubes behind the ring;

In inguinal hernia, the parts are generally protruded directly over the spermatic chord; at first, therefore, they penetrate the upper opening, and afterwards, having traversed the canal, make their appearance through the ring of the external oblique. They may enter the upper opening, and remain in the canal, without continuing their course through the lower one; or they may come directly through the inferior aperture, without passing along the canal. Each of these varieties will require a separate description.

and of the cremaster expanding over the spermatic vessels. A careful reflexion of the muscles just mentioned, from the crural arch, will bring the fascia transversalis into view, with the passage of the chord in the space left by its division; and a very little dissection will expose the epigastric artery on the inner edge of the upper opening of the canal. By laying down again in its place the reflected portion of the internal oblique and transverse muscles, their relation to the course of the spermatic chord may be exactly ascertained; and, as the attachment of the external oblique to the pubes still remains, the distance and relative position of the two openings may be immediately perceived. The most natural view of the superior aperture may be taken from within, by carefully removing the peritoneum from the crural arch, and adjacent parts. The fascia transversalis, with its division, may be then seen without any further dissection; the entrance of the spermatic vessels and vas deferens into the canal, and the course of the epigastric vessels are exposed in their most natural position; and the connexion of the fascia transversalis to the edge of the rectus is clearly seen.

The description of these parts is the same in the female, where the round ligament of the uterus supplies the place of the spermatic chord; except that the opening in the tendon of the external oblique is considerably smaller.

Section II.

Anatomical Description of the first Species of Inguinal Hernia; viz. that which comes through the Abdominal Canal.

The great majority of inguinal ruptures come under this description. The viscera are protruded through the opening left between the two portions of the fascia transversalis, and under the margin of the internal oblique and transverse muscles: they pass through the abdominal canal, and come out at the aperture in the tendon of the external oblique muscle. The mouth of the sac is the upper opening of the canal, and is therefore placed nearly in the middle of the space between the anterior superior spine of the ilium and the angle of the pubes: from this point the neck of the sack extends obliquely downwards and inwards between the aponeurosis of the external oblique, and the fascia transversalis; and

the production of peritoneum, escaping through the lower opening of the canal is continued directly downwards.

When the hernia is first formed, the distance between the two openings and their relative position are the same as in the natural state. But the pressure of the protruded viscera, by enlarging the superior aperture, gradually brings it nearer and nearer to the inferior; so that in an old and large rupture, the opening into the abdomen is almost direct. The effect of this process is such, in all cases, that we seldom meet with an instance, in which the rupture has passed the tendon of the external oblique, where the natural distance between the two openings is preserved.

The peritoneum, being protruded directly over the spermatic vessels, passes between these and the cremaster muscle. The latter part, together with a condensed cellular substance, forms a covering, which envelops the chord, and the testis with its membranes, and is described by some anatomists as the tunica vaginalis of the spermatic chord. The hernia is placed between this and the spermatic vessels; the sac is consequently provided with an exterior investment from this source; and the covering is common to it with the chord and testis. Some tendinous fibres, derived from the aponeurosis of the external oblique, where it

forms the lower opening of the abdominal canal, may be occasionally seen in this external investment. The pressure of the tumour occasions a considerable thickening of this part in old herniæ, where several distinct layers may often be recognized; and the thickness of the sac, taken altogether, depends on this circumstance. The external pudic vessels are distributed about the sac and integuments, and their branches acquire a considerable size in old scrotal ruptures*.

Surgeons in general have not been aware of the existence of the external covering now described. They have supposed the hernial sac to consist merely of peritoneum in various states of density: and represent the thickened state, in which it is frequently found, to arise from distension. Yet some writers have understood the real nature of the case. MERY† found three coverings over the sac in a very large hernia; and PETIT‡, in describing the operation, speaks of exposing and dividing "the membranes common to the hernia, with the spermatic chord and testicle." The peritoneal sac, according to MAUCHART§, is surrounded by a thicker external coat,

* CAMPER, tab. 13.

† *Mem. de l'Acad. des Sciences.* 1701. "Observations sur les Hernies."

‡ *Tr. des Mal. Chirurg.* t. 2, p. 362.

§ *Dissertatio de Hernia Incarcerata, nova Encheiresi ex-*

separable into many layers, and having in its composition tendinous fibres derived from the aponeurosis of the external oblique muscle: for which reason he calls it *tunica aponeurotica*. The latter fact is noticed also by GUNZ*. SHARP† very correctly observes, that "when the herniary sac falls into the groin or scrotum, the investing membrane (of the spermatic chord), together with the cremaster muscle, which covers it, become distended, and form, in consequence of that violence, an absolute vagina." The exterior covering of the hernia is not only described but delineated by WRISBERG‡. He calls it *velamen accessorium*, and represents it in the view of a dissected oscheocele. A most explicit statement of the anatomical structure, with some excellent views of the parts, will be found in CAMPER§, from whom I take the following quotation:—"Cremasteres igitur musculi sunt, ab obliquo

tricata. Tubingen, 1722; and in HALLERI *Disput. Chirurg. Select.* t. 3. "*Saccus externus* multo crassior est interno, inque varias separari lamellas potest," &c. cap. 2.

* *Observationum Chirurgicarum de Herniis Libellus*. Lipsiæ, 4to. 1744. p. 50—51.

† *Critical Inquiry*, third ed. p. 5.

‡ *Commentationes reg. soc. scient. Gottingens*. 1778. p. 69.

§ *Icones Herniarum*, p. 13. The hernial sac and testis, inclosed in their common investment, are well exhibited in tab. 6 and 9; with the latter laid open in tab. 8 and 10.

interno et transverso abdominis orti, per involucrum membranaceum sub cute scroti dispersi, quocum velamentum efformant, funiculum spermaticum et testem undequaque cingens, quod in herniosis crassius tenaxque fit, et ex multis sibi invicem impositis lamellis constare videtur, cum chirurgia hernias attingimus. Velamentum illud facile a sacco herniæ digitis separatur, firmius autem adhæret vasis spermaticis." Lastly, a full description and representation of the facts are contained in Mr. COOPER's *Anatomy and Surgical Treatment of Inguinal and Congenital Hernia.*

The spermatic chord, since the viscera are protruded directly over it, is placed behind the hernial sac*. If the tumour has descended to the bottom of the scrotum, the chord lies behind it, through its whole course, and the testis, with its coverings, is in contact with the lower end of the swelling. Where the rupture is not so large, more or less of the chord can be felt between the lower end of the tumour and the testis. I have already described the common covering of the hernia, chord, and testicle, made up of the cremaster muscle and tunica vaginalis of the chord: this is connected universally by cellular adhesions to the parts which it invests, and more closely to the spermatic vessels than to the sac. The latter

* CAMPER, tab. 5, and 12.

part adheres firmly by similar adhesions to the spermatic vessels; and would require a very cautious dissection for its separation in the living subject.

The spermatic chord sometimes deviates from the course now described. Le Dran*, Schmucker†, and Mr. Blizard‡, have seen it lying in front of the sac. In other instances, its component parts have been separated by the tumour. The vas deferens, has passed on one side of the sac, while the spermatic vessels ran on the other§: or the former has been seen on the anterior and inner, while the vessels were placed on the posterior and outer part of the swelling ||. In other instances the vessels have been before, and the vas deferens behind the sac **.

The situation of the spermatic chord, at the upper opening of the canal, with respect to the sides of that aperture, hardly allows us to suppose that the contents of a rupture can be protruded in any other direction than over it; but we can

* *Traité des Operations*, p. 127.

† *Vermischte Chirurgische Schriften*, vol. 2, p. 55. He mentions two instances.

‡ Cooper, pt. 1, p. 49.

§ Cooper, pt. 1, pl. 5, fig. 5. Pott's *Works*, vol. 2, p. 68. Camperi *Icones Hern.* tab. 13, fig. 1.

|| Camper, tab. 8, fig. 2. Hey's *Practical Obs.* p. 146.

** Camper, tab. 8, fig. 1. Cooper, pt. 1, p. 9 and 10.

easily conceive that the relation of the tumour to this part may be changed in the canal, or at the lower aperture, so as to present the varieties just enumerated.

When we consider that the epigastric artery in the natural state goes first behind the spermatic chord, and then along the inner margin of the upper opening, and that the viscera are protruded over the chord, it will immediately appear, that, in the case of bubonocele, which we are now considering, the parts are protruded on the outer side of the artery, and that this vessel must be situated first behind the neck of the sac, and then on its inner side.* This is so precisely the case, that, if we examine the mouth of the sac towards the abdomen, its inner margin (the *mesial*, or that which is situated towards the pubes) seems to be actually formed by the course of the artery. It retains always the same situation in respect to the mouth of the sac: but the approximation of the upper to the lower opening brings it nearer to the pubes. In the natural state, it is about two inches from the angle of that bone, at the part where it bends along the inner margin of the opening; its distance at the corresponding part, in a bubonocele now before me, is only three quarters of an inch.

* CAMPER, tab. V. and XII.

The situation of this vessel, in relation to the neck of the hernial sac, is a point on which great variety of opinion has subsisted among surgical writers: this may have arisen in some degree from the actual variation in the position of the artery in the different forms of the complaint: but there can be no doubt that the chief cause has consisted in the want of a sufficient number of investigations, and particularly of the parts in their altered state. Thus, RICHTER* supposes that the artery is found near the external angle of the ring, in the diseased, as well as the healthy state of parts; and he supports his opinion by stating, that the vessel was divided in the dead subject by cutting upwards and outwards, and never, by directing the incision towards the linea alba. It is very clear, that these observations can only apply to the healthy state of parts. CAMPER† has noticed the change of situation which this vessel undergoes in inguinal hernia:—"In "herniis igitur inguinalibus, arteria et vena epi-"gastrica versus pubem a prolapsis intestinis "compelluntur." CHOPART and DESAULT not only knew the ordinary situation of the artery in bubonocele, but were acquainted with the more uncommon case which will be presently described,

* *Traité des Hernies*, p. 123.

† *Demonst. Anat. Pathol.* lib. II. p. 5.

in which it is found near the external angle of the ring. "Mess. CHOPART et DESAULT admet-" tent l'artere epigastrique au coté interne de l' " anneau, et rarement au coté externe dans le " cas de hernie."* This statement is confirmed by the testimony of ROUGEMONT,† who adduces his own experience on the subject, and rightly adds, that when the artery is on the outside of the ring, the spermatic chord is situated on the outside of the hernial sac. The variation in the course of the vessel is also correctly stated by SABATIER‡. The truth of the opinions entertained by CAMPER, DESAULT, ROUGEMONT, and SABATIER, is fully confirmed by the more ample experience and extensive researches of Mr. COOPER, whose excellent work on the anatomy and surgical treatment of inguinal hernia I have had such frequent occasion to refer to.

I am aware that a person who is not well acquainted with the anatomy of the abdominal muscles, will find a difficulty in understanding the account which I have given of the parts concerned in inguinal hernia. A clear notion of the subject cannot be conveyed by any merely

* ROUGEMONT in a note to his translation of RICHTER, p. 124.

† Ibid, p. 124.

‡ *Medecine Operatoire,* tom. I. p. 92.

verbal description, to a person previously unacquainted with it. In order to acquire a satisfactory knowledge of the parts, a careful investigation of them, both in their healthy and diseased state, must be combined with a reference to the best plates and descriptions. It may however facilitate the progress of a beginner, to enumerate the parts as they are met with successively, in dissecting a hernia from the surface downwards. The removal of the integuments exposes the exterior investment of the hernial tumour continuous with the margins of the ring, and formed of tendinous fibres from the aponeurosis, the cremaster muscle, &c. This is connected by cellular substance to the proper hernial sac formed of the peritoneum. When the aponeurosis of the external oblique has been detached from the crural arch, in the manner described in the first section of this chapter, this production of peritoneum is seen passing through the lower opening of the canal, and then continued upwards and outwards. Behind and above the ring, the inferior margin of the obliquus internus and transversus crosses the neck of the sac. When these muscles are reflected towards the linea alba, the fascia ascending from Poupart's ligament, and forming the upper opening of the ring, is exposed, and the epigastric artery is discovered, emerging from

the inner side of the hernial sac,* which, at this precise point, becomes continuous with the peritoneum lining the abdomen. The removal of the hernial sac will disclose the course of the spermatic chord in its descent towards the testicle; and when this is also elevated, the first part of the course of the epigastric artery, and its origin from the iliac trunk, are laid open.†

In the species of bubonocele now described, the cause of strangulation may exist in the upper aperture of the abdominal canal, or in the lower aperture, or in the neck of the sac. According to Mr. COOPER,‡ the first is most frequent in recent and small herniæ, the second in old and large ruptures. The stricture may occur in the upper orifice, where the parts have passed the ring completely, the tendon of the obliquus externus remaining loose and free: a rupture may also be strangulated by both openings at once.

The strangulation in the upper opening probably constitutes the case, which surgeons have generally described as arising from a stricture in the neck of the sac. We can readily conceive, that the parts, which form this opening, may

* CAMPERI *Icones*, tab. X. *F. M.*

† The work of CAMPER exhibits these facts very clearly, see Tab. V, IX, X and XII.

‡ Page 21.

produce a state of incarceration, while it is difficult to imagine that a soft and extensile membrane, like the peritoneum, which yields to any impelling or distending force, should acquire such a power of contraction, as to form a stricture on the prolapsed viscera. BERTRANDI* directly asserts, that the transversus and internal oblique sometimes cause strangulation. That the instances related by others are of the same nature, is rendered very probable by this circumstance; that the stricture is generally said to have been at some distance within the ring of the internal oblique; whereas if it were formed by the peritoneum, there seems to be no reason why it should happen in that particular situation. In three cases, which occurred to Mr. WILMER,† the

* *Traité des Operations*, p. 30.

† *Practical Observations on Hernia*, p. 3 and 15. In the advertisement to the second edition Mr. WILMER expresses himself very strongly as to the frequent occurrence of stricture in the situation we are now considering. "In one-third of "the cases in which the author has been obliged to have re- "course to the knife, the cause of the strangulation was in "the neck of the hernial sac; and he is convinced that if "the inexperienced operator considers the stricture to be "found only in the tendinous openings of the abdominal "muscles, many lives must be unavoidably lost. He was "early led to the consideration of this subject, having seen "the intestine burst by the rude efforts made to return it

stricture was more than an inch higher than the external opening of the tendon. ARNAUD* found a stricture two inches behind the ring, and LE DRAN has a similar observation.† Mr. HEY‡ was obliged to divide the ring pretty freely in order to get at the internal stricture.

In the first chapter of this work I have mentioned that a process of thickening and induration may take place in the mouth of the sac; and I have stated further, in the fifth chapter, that such a change will be promoted by the pressure of a truss. It cannot be doubted that the parts may experience stricture from this cause§, al-

" after the opening of the external oblique muscle had been " dilated, in two cases where the operation for strangulated " herniæ was performed during his attendance at the London " hospitals.

* See his remarks " *Of the Strangulation of the Intestine by the Peritoneum,* p. 353 et seq.

† *Observations,* p. 60.

‡ *Practical Observations,* p. 174.

§ Mr. WILMER says, that on passing the finger into the tendon of the external oblique, a stricture will often be found an inch higher in the neck of the hernial sac. " This stricture is annular, is sometimes thick and cartilaginous." Ed. 2. p. 41.

Mr. HOME divided the ring of the external oblique ineffectually; on opening the tumour, he found the intestine " closely embraced by the orifice of the sac." *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge,* v. 2, p. 100.

though such an occurrence is much less frequent than that of strangulation from the sides of the superior aperture. Whether the neck of the sac, or the border of the opening, form the stricture in these cases, the practical observation is the same; viz. that we may very often expect to find the tendon of the external oblique quite free, while the obstacle, which prevents the return of the parts, is situated further in towards the abdomen; and that there may be a stricture in this latter situation combined with one of the former kind.

Section III.

Bubonocele, which does not appear through the lower opening of the Canal.

The commencement of this species of rupture is the same with that of the preceding; viz. the protrusion of the viscera, over the spermatic chord, into the abdominal canal. As they do not overcome the resistance of the lower opening, the tumour is contained in the canal. The cremaster muscle is expanded over the sac, and the whole is covered by the aponeurosis of the external oblique. The spermatic chord is behind the sac, and the epigastric artery has the same relation to

its mouth, as in the preceding species. The transverse and internal oblique muscles pass over its neck, behind the aponeurosis of the obliquus externus; and they cause the stricture when it is incarcerated.

Although this form of inguinal hernia has not been well understood and clearly described, until lately, it has not entirely escaped observation. Le Cat* mentions two cases, where the aponeurosis of the external oblique muscle covered the tumour. Petit† had a tolerably clear notion of the anatomy, as the following quotation will prove: "Mais ce qui me fait croire que les hernies qui paroissent en cette endroit, ne se font pas toutes par l'anneau, c'est que j'en ai vu plusieurs situées sous l'aponevrose du grand oblique; de sor e que les parties, apres avoir poussé le peritoine au-delà du muscle transverse et de l'oblique interne, n'ayant pu forcer l'anneau de l'oblique externe, s'etoient réfléchies entre cette aponevrose et l'oblique interne, et y formoient une tumeur large et plate." Callisen‡ mentions an

* *Philos. Trans. Abridged*, vol. 10, p. 221.

† *Traité des Mal. Chirurg.* t. 2, p. 247.

‡ *Acta Societatis Medicæ Havniensis*, vol. 2. The following statement is given by Rougemont: "Une petite hernie crurale recente fut sur le champ si fortement étranglée, que M. Callisen pratiqua l'opération. Après avoir incisé la peau, il ne trouva point de hernie sous le ligament de Fallope, mais l'aponevrose de l'oblique externe au dessus de ce

instance in which the rupture was of this kind; although ROUGEMONT, who notices it in his additions to his translation of RICHTER, has so totally mistaken the nature of the case as to call it a crural hernia*.

We are indebted to Mr. COOPER for the first clear description of this case. In the first part of his work, chapter 14, he points out the distinguishing characters of the case; and he has illustrated the anatomical facts in the 3rd, 5th, and 6th plates. "This tumour (says he) occurs much more commonly than is usually supposed; for I have frequently found it in the dissection of bodies of persons who have never been suspected of labouring under the disease, nor ever wore a truss. When strangulated these cases more commonly fall under the care of the physician than the surgeon; for, as the patient himself is often not conscious of having a tumour at the groin, the symptoms of strangulation are ascribed to in-

ligament, étoit distendue en une tumeur de la grosseur d'un œuf de pigeon. Il incisa longitudinalement, et y trouva une portion d'intestin très inflammée" *Tr. des Hernies*, p. 304. *Addition*, numb. 9.

* MURRAY mentions the existence of incomplete herniæ, which have not come through the obliquus externus (p. 79); and strangulation by the transversus and obliquus internus, p. 13. *Diss. Animadversiones in Hernias Incompletas, casu singulari illustratæ.* Upsal. 1788.

flammation of the bowels, without a suspicion of the true cause having been excited*."

The tumour is small; for, if the protrusion increases, the parts escape readily through the lower opening of the canal. But I have lately dissected a case, in the female, which formed an exception to this rule. The aponeurosis of the obliquus externus was distended by a swelling equal in bulk to two fists, and a tumour of the size of an egg had passed through the lower opening. On turning back the tendon, it appeared that both these were parts of one hernial sac, which had been protruded at the upper opening, in the ordinary way, had increased to a large size in the canal, and had afterwards passed partially through the lower aperture.

Section IV.

Ventro-Inguinal Hernia.

I have explained already, that the space left above the pubes, between the two columns of the aponeurosis of the obliquus externus, through

* *Anatomy and Surgical Treatment of Inguinal and Congenital Hernia*, p. 48.

which the spermatic chord quits the abdominal canal, is closed behind by the fascia transversalis, connected to the tendon of the transversus and obliquus internus, near its insertion in the pubes. When the size and position of the opening in the aponeurosis are considered, we can hardly doubt that ruptures would take place through it much more frequently, were they not prevented by this structure. Yet their formation is not entirely obviated. We have the parts protruded under the edge of the transversus, and then through the lower opening of the abdominal canal. Such ruptures occur, according to Mr. Cooper*, "if this tendon, (viz. that of the transversus), is unnaturally weak; or, if from mal-formation, it does not exist at all; or, from violence, has been broken." I lately dissected a hernia of this species, where the fascia was neither thinner than usual, nor separated by any violence; but it had been protruded before the peritoneum, and formed a thick aponeurotic covering to the hernial sac.

Since the spermatic chord lies on the outer column of the aponeurosis of the obliquus externus, and this rupture comes directly over the pubes, the former part is placed on the outer side of the sac; more particularly at the point of pro-

* *Lib. Cit.* p. 51.

trusion. But I have seen the chord behind the sac, as in the more ordinary form of the complaint. The epigastric artery is situated on the outside of the mouth of the sac. Its course is not at all disturbed by the rupture: and it is consequently found, as in the natural state, at about three-fourths of an inch from the upper and outer extremity of the lower opening of the abdominal canal.

Since the parts are protruded, in this case, in so different a direction from that which they pursue in the two species last described, the sac is not covered by the cremaster muscle. How often it may be invested by a protrusion of the fascia transversalis, I cannot hitherto determine.

In dissecting this species of rupture, the spermatic chord, covered by its muscle, is found at the outer side of the sac. The latter part goes directly upwards, instead of upwards and outwards. The reflection of the obliquus externus exposes the lower edge of the obliquus internus and transversus crossing the neck of the sac immediately behind the lower aperture of the abdominal canal. By turning these aside, the continuity of the sac with the abdominal cavity is exposed just over the pubes, and the passage of the epigastric artery, at about half or three quarters of an inch on the outside of the mouth of the sac, is brought into view. The spermatic chord

has no connexion with the rupture behind the tendon of the obliquus externus.

The latter part, or the edge of the obliquus internus and transversus may be the seat of stricture in the ventro-inguinal hernia.

Mr. Cooper's work* contains the first description of this hernia, which can be deemed at all complete or accurate: but its existence had been noticed previously. Camper† seems to have met with an instance of it so early as the year 1759; and Mr. Cline‡ dissected a case in 1777. Chopart and Desault§ had probably observed it frequently, as they direct the incision of the ring to be varied according to the course of the epigastric artery. Rougemont|| had seen one example. The exact proportion, in point of number, between this kind of ruptures, and those of the species first described, has not been hitherto ascertained; it only appears that the latter are by far the most frequent.

The inguinal hernia of females does not require a particular description, as its anatomy resembles that of the same rupture in the male sub-

* Chapter 15.

† *Edinburgh Review*, vol. 1, p. 465.

‡ Cooper, pt, 1, p. 51.

§ *Traité des Mal. Chirurg.* t. 2, p. 263.

|| Richter, *Tr. des Hernies* p. 125 : note.

ject. The round ligament of the uterus has the same relation to the swelling, as the spermatic chord in the male. The parts may be protruded through the superior aperture, and be contained in the abdominal canal; they may pass through the whole canal: or they may be protruded directly through the inferior aperture. The only instance which I have seen of the latter kind, in the female, occurred in a subject, which was brought to the anatomical theatre at St. Bartholomew's hospital, for dissection; and it was discovered by Mr. HAFFENDEN, a very intelligent and industrious student, who pointed it out to me.

CHAP. X.

SYMPTOMS AND DIAGNOSIS OF INGUINAL RUPTURES.

THIS complaint is much more frequent in the male, than in the female sex. Its occurrence indeed in the latter is comparatively rare; while it has been calculated that forty-nine out of fifty ruptured males have this kind of descent. The greater dimensions of the ring in the male subject account satisfactorily for this difference.

It is observed more frequently on the right than on the left side; and the difference has been ascribed to the employment of the right arm in cases which require the greatest exertion of strength and activity.*

* En fait de hernies inguinales, il y en a un tiers de plus " du coté droit que du côté gauche; sans doute à cause des " mouvemens plus violens du bras droit. Il n'en est pas de " même des hernies crurales, dont la différence du côté gauche " ou droit n'est pas si sensible." JUVILLE, *Tr. des Bandages Herniaires*, p. 22.

Of one hundred and forty-two ruptured persons in the Hôtel des Invalides, SABATIER found that forty-four had ruptures on both sides; fifty-five on the right, and forty-three on the left side only. *Acad. de Chir.* t. 5, p. 886.

Section I.

Symptoms of Inguinal Hernia.

The inguinal hernia possesses the common symptoms which have been mentioned in the general description of the complaint. The additional circumstances, which bestow a distinctive character on this particular species, are derived from the situation of the swelling. The tumour extends from the abdominal ring to various distances in the scrotum. It is first perceived in the groin, and descends gradually in front of the spermatic chord. The testicle may be felt below or behind the swelling, and the spermatic chord can sometimes be traced at the back of the tumour. It always appears to extend into the ring, and is hence distinguished from most other affections of these parts.

The rupture assumes a very different appearance, when it is contained in the abdominal canal. The tumour in such a case is always very small,

According to Richter and Sabatier, inguinal epiplocele is most frequent on the left side, in consequence of the omentum hanging lower on that side. *Traité des Hernies*, p. 200. *Médécine Operatoire*, t. 1. p. 135.

insomuch that the patient himself may not be aware of its existence; and the circumstance of its being covered by the aponeurosis of the obliquus externus renders the margin undefined, and the case still more obscure. The swelling is placed just above the crural arch, and externally to the lower opening of the abdominal canal. These circumstances should induce us to examine the groin very attentively in cases where the symptoms lead to the suspicion of a hernia, and not to be contented with the patient's own account. Mr. Cooper* gives us an instance, in which a woman, with all the symptoms of inflammation of the bowels, frequent vomiting and constipation, denied the existence of any swelling at the groin or navel. Yet a small inguinal rupture was discovered after death.

The appearances of the swelling will not always enable the surgeon to distinguish the ventro-inguinal from the more ordinary species of the complaint: and this is the less to be regretted, as no practical benefit could be derived from such a distinction. If we observe the tumour passing directly upwards into the abdomen, over the pubes, and can ascertain that the spermatic chord is on the outer side of the rupture, we may judge that it is a ventro-inguinal

* Pt. 1, p. 56.

case. Mr. Cooper observes that these do not increase to that size which the ordinary cases frequently attain: all the instances which I have seen, have been comparatively small.

Section II.

Diagnosis.

An attentive examination of the origin, progress, and symptoms of the complaint will enable us to distinguish a rupture from the diseases of the chord or testis.

If we see a swelling of the scrotum uniform on its surface, which commenced below, and gradually ascended; if we cannot feel the testicle, but are able to discern the spermatic chord of its natural size, and in a healthy state, above the tumour, and particularly if we can distinguish a fluctuation, or discover a degree of transparency in it, we are confident that such swelling is caused by an effusion of fluid into the cavity of the tunica vaginalis testis. We conclude that the complaint is a rupture, when the swelling began at the ring, and gradually descended; when the spermatic chord cannot be felt, but the testicle may be distinguished: and when the symptoms

described above, as belonging to a rupture, exist at the same time.

A hydrocele sometimes extends along the chord as high as the ring, the swelling at the same time being so tense that no fluctuation can be perceived. The origin of the tumour below, and its gradual ascent; its being constantly of the same size; and the impossibility of distinguishing the testicle, shew that the case is a hydrocele. But, in a congenital rupture, the testis cannot be distinguished, as it is enclosed in the same bag with the protruded viscera. Here the continuation of the swelling into the ring, the variations in the size of the tumour, according to the position of the patient's body, its origin from above, and the impulse occasioned by coughing, will point out the existence of a protrusion. If the swelling has commenced below, and is invariable in its size; and if no impulse is felt on coughing, it is a hydrocele. Rare instances have been observed, in which fluid was collected in the cells of the spermatic chord; and they have been designated by the name of hydrocele of the spermatic chord. Here the swelling extends into the ring, and the position of the body affects its bulk, which may be partly diminished by pressure towards the ring. The origin of the tumour below leads to the distinction. If it had been

reduced in size by pressure, and enlarged again while the hand was still applied to the ring, that would be sufficient proof that it was not a rupture.

If the tunica vaginalis communicates with the abdomen, the tumour can be returned; and descends again, when the pressure is removed. The feeling of fluctuation, the transparency of the swelling, and the absence of the peculiar signs of hernia shew that the case is a hydrocele.

The want of connexion with the abdomen; the fluctuation, the invariable size, and the uniform surface of the tumour, distinguish a watery cyst in the spermatic chord from a rupture.

The sensation, which the convoluted and distended veins of a varicous spermatic chord impart to the fingers of the examiner, is so characteristic, that a person, who has once felt it, can hardly mistake cirsocele for hernia. But this observation, which is true concerning the recent form of the disease, does not hold good invariably: and the most experienced surgeons have confessed the difficulty of distinguishing in some cases between an omental hernia and a varicous state of the spermatic veins. A large and old cirsocele is soft and doughy to the feel, and like an omental hernia, extends into the ring itself, which may be enlarged from this cause. It encreases when the patient coughs, holds his breath,

or remains long in the erect position: and is lessened by the recumbent posture, or even in some degree by pressure. Notwithstanding this resemblance between the two complaints, an attention to the following circumstance will enable us to distinguish them. The cirsocele begins at the lower part of the scrotum, and rises towards the ring in proportion as it grows larger. The commencement and progress of an epiplocele are just the reverse of these. The augmentation and diminution of a cirsocele, under the circumstances just pointed out, are very gradual; and we cannot ascertain,, by applying the hand to the ring, that any thing passes into or out of the abdomen. The testis in this complaint is often diminished in size.

Mr. Cooper recommends the following mode of distinguishing the two complaints, in case of doubt. Let the patient be placed in a recumbent position, and have the swelling reduced. The surgeon presses on the ring with his finger, and allows him to rise. The pressure is sufficiently forcible to prevent any of the viscera from falling down, but not to stop the passage of blood through the spermatic artery. If the tumour should re-appear, while this pressure is kept up, the case is a cirsocele.

The absence of the testis from the scrotum,

together with the peculiar sensation excited by pressing the tumour, sufficiently discriminate the case of a testicle on its descent. When this organ is placed in the groin, it may, in some cases, be pushed partially into the ring, and it afterwards descends. The application of a truss would probably occasion such pain as to discover the nature of the case, even if the absence of the part from the scrotum had not been perceived.

Scrotal hernia may be combined with any affection of the chord or testis; and such a complication renders the diagnosis more difficult. If we can return the protruded parts, the nature of the other disorder will be more easily determined: and the history of the case will probably assist in elucidating the subject.

Since the round ligament is not liable to those disorders which attack the spermatic chord and testis, the diagnosis of inguinal hernia, when it occurs in the female, is not so obscure and difficult as in the male. It may be mistaken for crural hernia, as I shall explain in the chapter on that subject. The ascent of the uterus occasions it to disappear during pregnancy.

CHAP. XI.

OPERATION FOR STRANGULATED INGUINAL HERNIA.

THE operation for bubonocele, as indeed for any other species of rupture, consists of the following parts: incision of the integuments; dissecting down to the sac, and opening it; removing the stricture; and replacing the protruded viscera. The following account applies particularly to the first species of inguinal hernia; and the points of difference in the other kinds will be noticed subsequently.

SECTION I.

Exposing and opening the Hernial Sac.

THE patient should be placed in the horizontal position, with his pelvis at least as high as the rest of the trunk. It will therefore be convenient for him to lie on a bed, with his lower extremities hanging over the side. The thigh should by

maintained in the bent position, by placing the foot of the affected side on a chair. The hair must be completely removed from the tumour and surrounding parts. The operator, being seated between the lower extremities of the patient, makes his external incision, which should begin an inch above the external angle of the ring, and extend over the middle of the tumour, to its lower part. By beginning the incision above the ring he gains room where it is much needed in a subsequent part of the operation; viz. the incision of the stricture: and for the same reason he should cut through the cellular and adipous substance in this situation, so as to expose fairly the aponeurosis of the obliquus externus. This cut may be either performed by a stroke of the knife, or, as some prefer, by pinching up the integuments, and dividing the fold with a double edged scalpel. In the latter case the incision generally requires to be enlarged in both directions. The single cut is accomplished with less pain to the patient, and has the appearance of greater adroitness. In executing this incision, or in the subsequent dissection down to the sac, the external pudic* branch of the femoral artery may be divided, and afford a sufficient

* The origin and course of the vessel may be seen in CAMPER's XIII. plate.

hemorrhage to induce us to secure it before we proceed.

The cellular substance intervening between the skin and hernial sac, and the external investment of the latter, should be carefully divided, layer by layer, with the knife and dissecting forceps. An operator, who is not well acquainted with the anatomical structure, may conceive that he has opened the sac itself, when he has divided the outer covering only, where that is close and firm in its texture. To avoid all risk of cutting through the sac, and wounding the prolapsed parts, each successive layer may be elevated with the forceps, and divided with the knife inclined somewhat towards the horizontal direction: this precaution should be more particularly observed as we approach the sac. It is sufficient to dissect down in this way at one part: the opening in the sac may be made by elevating it with the forceps, and dividing the apex of the elevated portion with the knife held horizontally; or we may use the finger and thumb, pinching up the membrane between them, and rubbing them together in order to ascertain that none of the protruded parts are included. The aperture should be enlarged in both directions with the probe-pointed bistoury, guided by the finger or director, until the whole cavity is laid open. The sac generally

contains a small quantity of fluid,* the discharge of which shews that the cavity is penetrated; and as this fluid gravitates towards the lower part of the tumour, that should be selected for dissecting down to the sac.

As this fluid is not always present, the surgeon cannot depend entirely on its appearance as indicating that the cavity is opened. The blood vessels of the intestine, and its smooth polished surface distinguish it from the hernial sac, which has not those vessels, which is rather rough and cellular on its surface, and which is always connected to the surrounding parts, although these adhesions in a very recent case may be but slight. The operator must remember, that, when the sac is opened, a probe or the finger will pass freely in any direction within its cavity:† the division of the exterior investment often leads him to suppose that he has cut into the true hernial sac.

* The fluid of the hernial sac is sometimes accumulated in very large quantity. SCHMUCKER has seen a quart of water in a rupture—(*Vermischte Chirurg. Schriften*, vol. II. p. 55.) Mr. POTT has often found so large a collection in old omental herniæ, that it was necessary to puncture them for its discharge—(*Works*, vol. II. p. 39.) MONRO removed six pints from an old scrotal rupture, to the great relief of his patient, (*Edinburgh Essays*, vol. V. p. 259.)

† The accidental circumstance of adhesions between the investing membrane and the contained parts hardly deserves to be mentioned as an exception to this observation.

Many surgeons are accustomed to make great use of the probe in this part of the operation: they thrust the blunt end of the instrument into the cellular substance, and divide with the knife what they have thus raised. This practice carries with it a great appearance of roughness and aukwardness, and is a much less convenient and speedy way of accomplishing the intended object, than the method which I have described.

The variations, which I have mentioned in the course of the spermatic vessels and vas deferens, should lead us to ascertain, if possible, the situation of these parts before we operate, that we may avoid all risk of wounding them. The practice of dividing the integuments and hernial sac separately, and of dissecting the intervening substance cautiously, will protect these vessels from danger where their course cannot be made out. The plan, which has been recommended, of making a small cut in the skin, of opening the cavity of the tumour, and then carrying the incision through the rest of the skin and hernial sac at once, would certainly expose them to considerable danger. Mr. Hey* divided the vas deferens in this manner.

* *Practical Obs.* p. 146.

Section II.

Incision of the Stricture.

The contents of the hernia, being thus exposed, may sometimes be returned into the abdomen, without dividing the ring; and they should be so replaced, if it can be done without force. When this cannot be accomplished, the finger should be introduced gently into the neck of the sac, in order to ascertain the seat of the stricture. The incision of this should be accomplished by a curved probe-pointed bistoury* guided by the finger of the operator, which will guard the protruded parts: should the tightness of the contraction exclude the employment of the finger, its place may be supplied by a grooved director, the protruded parts being at the same time carefully drawn aside to avoid all risk of wounding them. The finger should be carried

* The operator generally employs the crooked knife, which is contained in his pocket case of instruments; the blade of which is moveable on the handle. It would be much more convenient for operating on herniæ, to have one with a fixed blade, or, at all events, one of that construction in which the blade becomes fixed when the knife is opened.

as far into the neck of the sac as it can be without violence, and between the protruded parts and the upper margin of the stricture. The bistoury, with its back resting on the finger, is pushed forwards towards the abdomen, followed and supported by the finger, which protects the viscera.

The length of the incision should not exceed what is sufficient to allow the viscera to be replaced with ease.*

* A French surgeon proposed to dilate, instead of cutting the stricture. He employed, for this purpose, an instrument composed of two blades, united like those of scissars, and forming, when closed, a concavity on one surface, and a smooth convexity on the other. It was introduced into the ring in this state, with the concavity towards the protruded parts; and the blades were then expanded so as to produce a sufficient dilatation. Le Blanc, *Nouvelle Méthode d'operer les hernies*, &c. 8vo. Paris, 1768: and *Refutation de quelques objections*, &c. 1769. The method is also described in his *Operations de Chirurgie*, tom. 2.

The difficulty and danger of cutting the stricture, and the fear of weakening the parts by the incision were the chief circumstances which led Le Blanc to adopt the plan of dilatation. It has not, I believe, been practised in this country. Indeed, if there is sufficient room to introduce a dilator, it is reasonable to expect that the parts may be replaced.

Several instruments have been contrived for the purpose of dividing the ring; such are the winged director of Mery, with two lateral processes to guard the protruded parts; the scissars of Morand, the bistouri herniaire of Le Dran,

The proximity of the epigastric artery to the mouth of the sac renders the direction of the incision a matter of considerable importance; while the various opinions concerning the course of the vessel have led to a corresponding difference in the directions for executing this part of the operation. The practitioners of this country have generally followed the advice of SHARP* and POTT,† who direct the knife to be carried upwards and outwards, *i. e.* towards the spine of the ilium; and there is no danger of injuring the vessel by cutting in this direction, in the generality of inguinal ruptures. But it would be endangered in the more rare case, where the hernia descends on the inner side of the artery; although, even here the vessel is situated at such a distance from the external angle of the ring, that the return of the parts can seldom require so large an incision as to expose it to danger‡.

&c. all which may be seen in the 24th plate of HEISTER's *Institutiones*. These devices are so decidedly inferior to the blunt-ended bistoury, guided by the finger, that they are now nearly forgotten.

* *Critical Inquiry*, p. 29.

† *Works*, vol. II. p. 106.

‡ That the direction of the incision towards the spine of the ilium does not necessarily endanger the epigastric artery, when this vessel takes its course along the outer side of the hernial sac, is satisfactorily proved by a case, which I have related in a subsequent part of this chapter. We are indeed

Those surgeons, who have supposed that the artery has the same relation to the abdominal ring in the diseased, as in the natural state of parts, direct the incision to be made in a course precisely opposite to that abovementioned. Richter* and Bertrandi† carry the knife upwards and inwards, or towards the umbilicus: their advice might be followed in the more rare instances, where the artery is on the outside of the rupture; but would be highly dangerous in the common case, where it runs along the inner margin of the mouth of the sac. The danger increases in proportion as the incision approaches to a course directly inwards; and the vessel must inevitably be cut if the knife were guided horizontally towards the linea alba. Chopart and Desault‡ vary the direction of their incision according to the actual variation in the position of the artery: thus, they

justified in concluding, that the artery has often escaped under these circumstances, when we consider that it has been, and still is the general practice, to cut the tendon upwards and outwards, and yet that a wound of the vessel seems to be a most rare occurrence. Mr. Pott must have performed the operation for the strangulated bubonocele a vast number of times: yet no instance of a division of the artery is recorded in any part of his works; nor did he mention any such case in his surgical lectures.

* *Traité des Hernies*, p. 123.

† *Traité des Operations*, p. 29.

‡ *Traité des Maladies Chirurgicales*, tom. II. p. 263.

divide the tendon upwards and outwards, when the spermatic chord is behind, or on the inside of the sac; upwards and inwards, when it is before, or on the outside of the hernia*. The view, which I have given of the anatomy of the parts, will shew that the artery can never be exposed to the slightest risk, if this direction be followed. It happens, however, unfortunately, that we cannot always ascertain sufficiently the nature of the case; that the distinguishing marks of the two kinds of rupture are not laid down with sufficient accuracy, to enable practitioners in general to decide upon the subject. Nor indeed does the case seem to me to admit of such a diagnosis. A common case of scrotal hernia, in which the upper opening, from the duration of the complaint, has been brought opposite to the lower one, cannot be distinguished by external examination from that species, in which the viscera

* Although it will hold good, as a general observation, that the spermatic chord passes behind the hernial sac in the common species of inguinal rupture, and on the outer side of this part in the less frequent kind; the vessel does not invariably follow these directions; I have seen it directly behind the sac in a case of the latter description; and the varieties in its course, enumerated in SECT. II. of CHAP. IX. prove satisfactorily that we cannot regulate our mode of executing this part of the operation by the position of the spermatic chord.

protrude directly from the abdomen. The spermatic chord cannot be felt, and if it could, its position could not be relied on as an indication of the course of the hernia. In case of doubt, ROUGEMONT* directs us to divide the ring directly upwards, *i. e.* in a course parallel to the linea alba, as the artery can never be endangered by cutting in that direction. Mr. COOPER adopts this practice of ROUGEMONT, and follows it in all cases; very rightly considering that a multiplicity of directions, adapted to various circumstances, might confuse those, who are but imperfectly acquainted with the structure and relative position of the parts; and that, on this account, it is desirable to lay down a general rule, which may be followed without danger in every instance of inguinal rupture. The precise

* "Je crois d'apres cela, qu'il est permis de croire qu'on "courre moins de risque de léser l'artère épigastrique en in- "cisant en haut et en dehors, qu'en incisant en haut et en "dedans; que pour reconnoitre exactement la disposition de "cette artère, il faut s'assurer de la position du cordon sper- "matique relativement au sac; et supposé que cela soit im- "possible, il faut inciser au milieu du bord superieur de "l'anneau."—Note to RICHTER, p. 125.

PETIT divided the stricture directly upwards in the bubonocele. Having placed the edge of his instrument against the upper angle of the wound, he says, "Je le pousse en dedans, "en appuyant le tranchant vers le haut." T. 2. p. 367.

point, at which the incision of the tendon should be made, is at the middle of the superior margin of the ring; the artery can never be situated at this part, nor be exposed to danger unless the incision be extended to a most unreasonable length.

When the stricture is in the superior orifice of the ring, the epigastric artery is invariably found on the inner margin of the aperture; and cannot therefore be injured by carrying the incision towards the spine of the ilium; nor does the practice of cutting directly upwards expose it to any risk. The instruments to be employed in dividing the stricture, and the manner of using them are nearly the same as when the tendon of the external oblique causes the incarceration. The bistoury recommended by Mr. Cooper, which has a cutting edge extending only to a certain distance from the point, should be employed for this purpose. It must be introduced with the flat side towards the finger, until the probe point has passed under the stricture, when it may be turned up so as to bring its edge in contact with the margin of the transversus, and to divide that muscle to the required extent.

The protruded parts may be strangulated, both in the upper and lower openings, at the same time, so as to require an incision in both these situations for their complete liberation. Hence the division

of the tendon of the external oblique does not always set the parts free; and the surgeon should in every instance pass his finger in the direction of the ring, to ascertain whether any further stricture remains to be divided.

If the incarceration be caused by the upper opening only, there can be no necessity for enlarging the ring of the external oblique; unless it should so confine the finger of the operator, that he cannot reach the stricture. This circumstance can hardly happen, when the incision of the integuments has been begun sufficiently high: yet it did take place in the case which I now proceed to relate; and of which I am induced to mention the particulars, because they are interesting in several points of view.

CASE.

A MAN about fifty years of age had been subject for many years to a rupture, which could be returned without difficulty. Constipation took place on the 24th of January, 1806, and, as it could not be removed, he was brought to St. Bartholomew's hospital on the 30th of the same month. His belly was distended, but not painful; and a slight degree of sickness was present.

About half way between the ring and scrotum he had a soft and somewhat elastic tumour of the size of a pigeon's egg, which bore pressure without causing pain. The ring of the external oblique was perfectly free from tension; there was no testicle on that side of the scrotum. Strong cathartics and tobacco clysters having failed in procuring any relief, the operation was performed on the seventh day from the strangulation. The tumour consisted of a hernial sac full of fluid; when this had been laid open up to the external oblique, the operator discovered that a piece of intestine was strangulated in the internal aperture. He could just reach this with his finger; but he was obliged to divide the lower ring extensively, before he could remove the stricture of the upper opening: this was at last effected, and the intestine returned. No blood was shed during the operation. Mild and stronger purgatives, and clysters were all equally ineffectual in removing the constipation, and the patient died on the following evening. The tendon of the external oblique muscle had been cut upwards and outwards for two inches: it had also been divided upwards and inwards for a space of three-quarters of an inch. The latter incision, which had included the inferior margin of the obliquus internus and transversus, had completely divided the epigastric artery at three-

quarters of an inch from its origin. It did not appear that the smallest quantity of blood had escaped from the divided vessel. Within the abdomen, and just behind the ring, there was a small piece of intestine perfectly black and gangrenous, which had been strangulated by a preternatural band of adhesion, extending from the peritoneum, close to the ring, to the mesentery. The convolutions of the small intestine, exceedingly distended (to two and three inches diameter) seemed to fill the whole abdomen. They were slightly agglutinated to each other, and marked here and there with red streaks. The lower extremity of the testis lay just in the upper opening of the ring*.

* The state of the testis in the present case leads to some interesting remarks. The body of the gland was not more than half its usual size: the epididymis, which was very imperfect, ran for about an inch behind the hernial sac, and did not join the body of the testis. Another case of hernia, which I had the opportunity of examining through the kindness of my friend Mr. CROWTHER, presented the same appearances, viz. an imperfect body of the testis just within the ring, and an incomplete epididymis, which ran down behind the hernial sac. Both the preparations are preserved in the museum of St. Bartholomew's hospital. These cases corroborate the opinion of Mr. HUNTER concerning the cause of the testicles not quitting the abdomen. He says upon this subject, "I am "inclined to suspect that the fault originates in the testicles

This case shews us, that strangulation may proceed to the complete mortification of the intestine, without producing any of those symptoms, which are ordinarily described as attending such a termination; with the production indeed of very slight inconvenience to the patient. It demonstrates the danger of cutting upwards and inwards, and it proves that the epigastric artery *may* be divided without the slightest hemorrhage ensuing from the division.

Section III.

Wounds of the Epigastric Artery.

I cannot quit this part of the subject without adding some remarks on the effects of cutting the epigastric artery. Surgical writers have generally stated that a division of this vessel would be attended with a fatal hemorrhage; and the size of its trunk, together with its immediate origin

" themselves," and again " When both testicles remain " through life in the belly, I believe that they are exceedingly " imperfect, and incapable of performing the natural func- " tions of those organs; and this imperfection prevents the " disposition for their descent from taking place."—*Remarks on the Animal Economy*, p. 16 and 18.

from so large an artery as the external iliac, render the assertion very probable. Yet I have not been able to meet with any recorded cases, in which actual examination has proved a wound of this vessel to be the cause of death.* GUNZ† says that he heard of two cases in Paris, in which the artery had been divided. BERTRANDI‡ and RICHTER§ assert in general terms that a fatal hemorrhage has ensued several times from division of the epigastric artery. Mr. COOPER ‖ gives us an instance, in which a person died from hemorrhage after the operation; and another, in which repeated bleedings brought the patient very low. In one of Mr. HEY's** cases there was considerable bleeding, but it was stopped by the use of sponge. The case, which I have just related, presents an example of the epigastric

* I mean in hernia. Dr. CARMICHAEL SMITH enumerates ten cases, in which death ensued from hemorrhage in consequence of the epigastric artery, or some branch of it being wounded in the operation of tapping.—*Medical Communications*, vol. II.

† *Obs. Anatomico-Chirurg. de Herniis.* "Quod etsi non invenio ab ullo observationum auctore commemoratum fuisse, tamen, quando Parisiis eram, duo exempla herniis affectorum accepi, qui ex vulnere hujus arteriæ vitam amiserunt."

‡ *Traité des Operations*, p. 29.

§ *Traité des Hernies*, p. 125.

‖ Page 53.

** Page 159.

artery being completely divided, without occasioning any hemorrhage during the operation, or previously to the patient's death. I have seen another instance, in which it seems certain that this vessel must have been cut, but the fact was not ascertained.

CASE.

In the operation for femoral hernia the stricture was divided upwards and outwards. As the first incision did not gain sufficient room for the return of the intestine, the cut was extended in the same direction. The wound immediately filled with arterial blood, which rose again almost directly to the edges of the incision, when removed with the sponge. The mouth of the vessel could not be distinguished; while we were deliberating on the propriety of passing a needle in such a direction as would be likely to include the artery, the patient, who had lost about a pint of blood, fainted, and the bleeding ceased; nor did it come on again. This woman recovered completely.

In addition to these circumstances, I may state, that the occurrence of hemorrhage, even to a very considerable amount, after the opera-

tion, is by no means a certain proof that the epigastric artery has been wounded; and that large bleeding may occur, where examination after death does not detect a wound of any considerable vessel. These assertions will be justified by the following case.

CASE.

The operation for bubonocele was performed on a man, at St. Bartholomew's Hospital, October 18, 1806, the tenth day after strangulation. The intestine was generally adherent to the neck of the sac, and its return required but a very small division of the ring, which was made upwards and outwards. No blood was shed during the operation; hemorrhage however took place on the same evening, but yielded to the application of cold cloths. Symptoms of inflammation occurred in the following evening, and were not subdued till the end of four days; in which time the patient lost ninety-six ounces of blood from the arm, and had twelve leeches applied to the abdomen. On the morning of the eighth day a profuse hemorrhage took place from the wound; it consisted of arterial blood, and did not cease till two pints at least had been lost. He survived this occurrence about a week, during part of

which time well-grounded hopes of his recovery were entertained. The most violent and general inflammation was found to have taken place over all the small intestines. They were throughout of a florid red colour, and coagulable lymph had been deposited in considerable quantity on the surface. The parts forming the rupture had been protruded on the inner side of the epigastric artery, which, with its accompanying veins, was at least three quarters of an inch from the point to which the incision of the ring had extended, and of course had not received any injury. The spermatic chord passed on the outer side of the hernial sac, but had not been wounded. It appeared that a small artery, which the epigastric sends to the spermatic chord, had been cut; but its size did not seem at all adequate to the supply of so profuse a bleeding*.

The conduct which a surgeon should pursue, in case he had divided the epigastric artery, would probably be influenced by the circumstances of the case in which the accident hap-

* In a case of scrotal hernia, related by Mr. HOME, a hemorrhage to the amount of a pint occurred on the tenth day after the operation. *Transactions of a Society, &c.* v. 2. p. 109. And profuse bleeding came on after the operation in an instance recorded in DUNCAN's *Commentaries*, v. 1. p. 413.

pened. If the extent of the hemorrhage induced an opinion that this vessel had been cut, the operator should dilate the wound in order to gain as near a view as possible of the source of the bleeding: and should then use the needle and ligature accordingly. The chance of stopping the hemorrhage will be much increased, if his knowledge of the anatomy of the parts be accurate.

Section IV.

Incision of the Tendon without including the Sac.

In all the remarks which I have made respecting the division of the stricture, I would have it understood, that the portion of peritoneum, which constitutes the neck of the sac, is to be included in the incision. A deviation from this, which is the usual mode of operation, has been proposed by Mr. Cooper*. He would have the tendon only divided, being unwilling to implicate the sac in the incision, and therefore insinuates his curved bistoury between these parts. He mentions two advantages as connected with this

* Pages 28 and 30.

method. The incision in the sac, being more remote from the peritoneum, will be less likely to excite inflammation in that membrane; and if the epigastric artery should be wounded, it will not bleed into the abdomen. An accurate comparative trial of both methods would be necessary in order to determine the weight of the first reason. The second circumstance cannot be a matter of any importance, if we cut in such a direction as to avoid the risk of wounding the artery.

Many circumstances present themselves as objections to this proposal. The manœuvre itself, although perhaps easy to the experienced hand of such an able anatomist as Mr. Cooper, would, I am convinced, be found highly difficult, if not impracticable, by the generality of surgeons. This difficulty arises from the firm manner in which the sac and surrounding parts are connected, we might almost say, consolidated to each other. The experience of Richter* shews that this objection is founded in reality. He once tried to divide the ring, without cutting the sac, but he found it impracticable. If the stricture is so tight, as to prevent the introduction of the finger, there must be great danger of wounding the protruded parts.

* *Traité des Hernies*, p. 118.

The practice would still be not advisable, even if it could be rendered as easy as the common method of operating. Mr. Cooper leaves an inch of the sac below the ring undivided; thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished. It would be better to follow the advice of Richter, and scarify the neck of the sac, in order to promote the adhesion of its sides. He has found this practice so successful in accomplishing a radical cure, that he advises its employment in every operation for strangulated hernia*.

The plan of removing the stricture, and returning the prolapsed parts without opening the sac at all, ought, I think, to be more frequently adopted than it has hitherto been, although it appears objectionable, as a measure of general use, in the operation for strangulated hernia. The particular cases in which this method is advisable, and the reasons on which its propriety is grounded in such instances, are considered in a subsequent part of this chapter. I am aware that the difficulty of performing any operation should not be urged as an argument against it, if it can be proved to be attended with advantage; yet I really think that the share of anatomical knowledge, which falls to the lot of surgeons in

* *Traité des Hernies*, p. 191.

general, is not sufficient to enable them to adopt this mode of operating without danger. If the parts be adherent to each other, or to the sac, they cannot be returned without opening the latter cavity; hence this must be done at last, or else the patient will be left with an irreducible hernia, that will constantly expose him to the risk of a future strangulation*. How often does the state of the omentum require that a part of it should be removed, either because it has increased so much in size, as to be irreducible without a very extensive dilatation of the ring; or because it is so altered in structure, that it must necessarily perish. If, in the mode of operating which we are now considering, a portion of this viscus should be returned into the abdomen in a gangrenous state, and slough in the cavity, it would constitute a source of most serious danger to the patient; and very probably cause a fatal termination. The consequences of returning a gangrened intestine into the abdomen must also be considered, as this might very easily take place. It often happens that this change is not indicated by any symptoms, and that it occurs in an early stage of the complaint: it is also most frequent

* Monro mentions four cases, in which he attempted this operation; he was obliged to cut the neck of the sac in two; and adhesions prevented the return of some of the parts in the third. *Description of all the bursæ mucosæ, &c.*

in small herniæ. The effusion of the contents of the intestinal canal into the abdomen, when the eschar gives way, would be attended with the most dangerous consequences. The chance of a reproduction of the hernia must be much increased by the practice of leaving the sac unopened; indeed the viscera must necessarily descend into the bag which remains in the groin ready for their reception.

The utter impracticability of the proposal for returning the sac into the abdomen with its contents, except in the most recent cases, accounts sufficiently for its never having been put in practice, and relieves me from the necessity of considering it more at large*.

* Petit, who first proposed the division of the ring without opening the hernial sac, used to place a compress of lint on the part, after the operation; he states that the sac has in many instances gradually returned within the ring; and that it will always do so in small or middle-sized ruptures, particularly if we push up at first as much of it as we can. See his posthumous work, *Sur les Mal. Chirurg.* t. 2. p. 375. Garengeot, in describing the proceeding of Petit, says, that after pushing up the parts, "il entasse le sac en un petit bloc, "et le met dans l'overture meme de l'etranglement; et par-"dessus une petite pelotte qu'il a imaginée." The elder Monro adopted this view of the subject. He directs that the sac should be left entire, and pushed up into the ring, "if the "disease is recent, with the sac thin, and not folded into "wrinkles, or straitened where it is coming through the pas-"sages in the muscles, or *grown to any other part.*" *Edinb.*

Section V.

Replacement of the Protruded Parts.

The last step of the operation consists in returning the protruded parts, which, if they are sound and not adherent, may be immediately performed. The limb should always be in a

Essays, v. 5. Art. 21. The direction of Petit can only be understood as extending to the pushing of the sac partially, like a plug, into the ring: and not as advising a *reduction* of it within the ring. Monro too speaks particularly of recent cases: and they must be very recent indeed, if the sac has not become adherent to the surrounding parts. Mr. Cooper relates the case of a small inguinal hernia in the female, where the sac with its contents was returned unopened. Pt. 1, p. 49. The remarks now quoted have been considered as authorising a general practice of replacing the sac; and Le Dran's case, which I have already alluded to, Chap. VIII. Sect. 2, if the facts could be believed, would countenance such a supposition. But a correct view of the anatomical structure strongly opposes these notions. The universal and firm adhesion of the sac to all the surrounding parts; its very close connexion to the spermatic vessels; and the difficulty of detaching it, particularly in the case of varieties in the position of the chord, will always constitute insuperable objections to such a proceeding; which promises no particular advantage, even if it were easily practicable.

bent state during this part of the operation. No condition of the intestine, except actual gangrene, is considered as prohibiting its replacement.*

The strictured part is frequently altered in colour, and to such a degree, that we should at first be inclined to think it unsafe to return a gut so changed into the abdomen. If this alteration has not proceeded so far as mortification, experience† warrants us in replacing the part; and the following case is a further proof of the propriety of this practice. The diseased action, indicated by the altered colour of the bowel, may be expected to cease, when its exciting cause no longer exists.

CASE.

Thomas Lucas, a negro, was brought into

* Superficial wounds inadvertently inflicted during the operation have not been injurious. Richter, *Chirurg. Biblioth.* b. 4, p. 159.

† The intestine successfully returned, when resembling a tamarind stone in colour; *Med. and Phys. Journal*, v. 10: of a dark brown colour; Warner, case 39. More than an ell of a black brown colour replaced with a fortunate result, *Chirurg. Wahrnehm.* 2, 293. Half an ell replaced, of a colour nearer to black than brown, with subsequent recovery. Acrel, *Chirurg. Vorfälle*, b. 1, p. 395. See also Theden, *Neue Bermerkungen*, &c. erster Theil, p. 95.

St. Bartholomew's hospital, with a strangulated bubonocele, on the morning of the 14th of January, 1807. The incarceration had taken place on the preceding evening at ten o'clock. Cold applications, continued for the space of four hours, and, combined with the repeated use of tobacco clysters, having proved ineffectual, the operation was performed by Sir C. Blicke at twelve o'clock. The case proved to be an intestinal rupture; and the strictured bowel for the length of two inches was, in the whole of its diameter, of the darkest brown and almost black colour: this portion was distinguished from the sound gut by a defined line. It was returned into the abdomen; but the depth and extent of the discolouration were considered as such unfavourable circumstances, that the patient was not expected to survive. Symptoms of enteritis having appeared within a few hours from the operation, sixteen ounces of blood were taken from the temporal artery;* and the bleeding was repeated soon after to the same amount. With this evacuation were combined the use of warm fomentations to the abdomen, the internal exhibition of a solution of magnesia vitriolata and

* The blood was drawn from this vessel, in consequence of the superficial veins of the arm being so unusually small, that, although they were opened in several places on both sides, no blood flowed from them.

manna in mint water, and clysters. On the following day thirty-six leeches were applied to the abdomen, and sixteen ounces of blood taken from the arm. These measures subdued the inflammation: but exhausted and weakened the patient to such a degree, that a nutritious diet, together with porter, wine, &c. were required for his support. He had completely recovered, and left the house about the middle of March.

In order to determine whether a discoloured portion of intestine be actually mortified, we are recommended to press forward the blood contained in the veins; and, if they fill again, it is considered as a proof that the part still retains its vitality. On the contrary, if it appears that coagulation has taken place, we may infer that the part has gangrened.

The discolouration, which I now allude to, consists of a dark brown, or chocolate tint: it is probably caused by the vessels being distended with venous blood in consequence of the pressure of the stricture. The colour of gangrene is black. In the former case the coats retain their healthy texture; in the latter they are flabby, and give way under the finger.

The omentum is often so much altered in structure as to render its return improper. The

conduct which the surgeon should pursue in the case of a mortified intestine, or of diseased omentum will be considered under separate heads. The finger should be passed in, after the replacement, to ascertain that the ring is free, and that the viscera have completely re-entered the abdominal cavity. In an entero-epiplocele the intestine is generally replaced first, and the omentum afterwards: if any of the mesentery should have descended, that must be returned before the intestine. A distended state of the gut sometimes forms an obstacle to reduction; if its cavity can be emptied by gentle pressure, it will generally go up. Let not the surgeon however use violence in such a case, but rather enlarge the division of the stricture. As the omentum always presents first, it generally covers the intestine from our view: hence we should unfold and carefully examine this part, as it often conceals a small portion of gut; and never cut it off until such examination has been effectually made. Instances have occurred in which the omentum has formed a complete bag, including a portion of intestine:* in such a case it must be divided

* Richter, *Traité des Hernies* p. 133. The two cases related by Mr. Hey seem to have been in some respects of this kind. *Pract. Obs.* p. 211 and 214.

sufficiently to expose the latter part. The possibility of such an occurrence must make us extremely cautious in the removal of a piece of omentum.

The contents of a rupture often adhere to each other, or to the hernial sac. When these adhesions are recent and tender, they may admit of being lacerated by the finger; if they have acquired firmness, they should be destroyed by the knife.

The intestines seldom adhere together very strongly: the most close and intimate adhesions are those which take place between the omentum and hernial sac. The surgeon should make it a rule to destroy every preternatural connexion before he returns the part;* the agglutination of the two sides of a fold of intestine has caused a sufficient obstacle to the passage of

* Mr. Pott never found the protruded parts in such a state of adhesion as to be incapable of being returned; but Arnaud relates cases in which the adhesions could not be destroyed. *Mem. de Chirurgie*, 1, p. 54. And Petit speaks of adhesions being so firm and general, that the hernia constitutes a fleshy mass, without distinction of intestine or epiploon, t. 2. p. 277. In a small crural hernia Mr. Taunton found the sac adhering so firmly to the intestine, that they could not be separated. *Philosophical Magazine*, v. 36, p. 316.

the alimentary matter, to induce a fatal termination*.

Reduction may be prevented by adhesions round the mouth of the sac; as these are not in sight, their destruction is a matter of some difficulty, and attended with danger of wounding the prolapsed viscera. This part of the operation may be facilitated by enlarging the incision both of the integuments and ring, so as to bring the adhesions into view. The precaution of introducing the finger, to ascertain that the viscera are completely disengaged, and that the ring is free, which should not be neglected in any instance, is more particularly necessary in the cases which we have now been considering.

If the sac, when large and thick, seem likely to prevent the approximation of the edges of the wound, or to retard their union, its sides may be cut away.

I cannot conclude my account of the operation for strangulated hernia, without again cautioning the surgeon to avoid violence in every part of its performance. He should accomplish the whole by means of the knife, as a clean cut wound unites much more speedily than one in which laceration or contusion have been suffered. If there is not sufficient room for accomplishing

* Cooper, page 53.

any particular purpose, let the incision be enlarged:* if the tightness of the stricture precludes the employment of the finger as a guide for the knife, let a director be used; where there are adhesions, let them be destroyed by the knife. I am convinced that the wound would unite more speedily, if greater attention were paid to this point. There seems to be no reason why its edges, like those of any other recent incision, should not become connected by the adhesive process. Such an event is particularly desirable in the present case, since numerous facts prove the importance of obtaining a speedy union of wounds, which penetrate circumscribed cavities, in preventing the occurrence of inflammation.

It is generally necessary to retain the lips of the wound in apposition, by means of one or more points of the interrupted suture, particularly when the scrotum has been divided. In the intervals between these, they should be still further approximated by strips of sticking plais-

* "I have more than once seen the intestine burst by the violence used by the operator to return it." WILMER, p. 3.

Mr. BELL gives a representation of an intestine much injured by the forcible attempts at returning it. *Elements of Op. Surg.* pl. XI.

The intestine has been torn in an attempt to lacerate an adhesion. ARNAUD, p. 317.

ter. Moderate pressure on the neck of the sac, by means of a compress, may promote the agglutination of its sides, and prevent any protrusion.

The patient, when laid in bed, should be directed to avoid most carefully every exertion, on account of the risk of a fresh protrusion. He should therefore lie as quietly as possible. The necessity of straining for the expulsion of the feces will be obviated by the directions given in the subsequent section, concerning the employment of laxative medicines.

It will be proper to place a small and soft pillow under the scrotum.

Section VI.

Treatment after the Operation.

The management of the wound requires no particular directions: it is a simple incision through parts of no consequence in themselves, and should be treated according to the ordinary principles of surgical practice in similar cases. If the progress of the case should be favourable, the first dressings need not be removed before the fourth day; after which time the applications may be renewed every twenty-four hours. Where

inflammation comes on, and the sides of the incision swell, the sutures may be removed, and a linseed or bread poultice applied in place of the adhesive straps.

As soon as the cicatrix has acquired a sufficient firmness, and before the patient leaves his bed, a truss should be applied; and it must be constantly worn after the cure. The operation only removes the immediate danger, leaving the patient still subject to a future protrusion, which indeed often takes place to a greater extent than before. Sometimes a radical cure is effected: but as this occurrence cannot be ascertained at first, it is right to adopt measures of precaution in every instance.

Evacuations per anum, and a considerable abatement of the symptoms in general, are the usual consequences of the operation. The former do not always follow immediately; and in all cases it is useful to solicit the action of the intestines by means of common clysters, and small doses of Epsom salt dissolved in mint water. There is frequently a large collection of fecal matter to be evacuated; and the operation of the purgatives cannot be otherwise than salutary, as it must diminish the tendency to inflammation. A light and sparing diet should be strictly enjoined until the complete recovery of the patient: the intestines remain for some time in such an irri-

table state, that the least irregularity in this respect brings on considerable disorder, and greatly impedes the progress towards recovery. Many instances have ended fatally, and great danger has arisen in others, from the injunctions of the medical attendants on this subject being disregarded.

Inflammation of the peritoneum is not an infrequent consequence of the operation for strangulated hernia. The contents of the abdomen are often tending to an inflammatory state before the operation, and the wound of itself is sufficient to bring on peritonitis. When a tense and painful state of the abdomen, hiccough, immediate rejection of every thing which enters the stomach, and obstinate constipation indicate the occurrence of inflammation, the most active means must be employed, without delay, and must be followed up until these symptoms are subdued. Our chief reliance will be placed in venesection repeated according to circumstances. Topical bleeding from the abdomen by means of leeches or cupping: warm fomentations to the part, the warm bath, blisters, purgative medicines, and injections must be combined with general bloodletting. Some of these latter remedies only may be sufficient in slighter cases. The patient is often reduced so low by the means employed to subdue inflammation, that it is necessary to sup-

port him afterwards by nourishing diet, by wine and cordial medicines. When the intestine has become considerably inflamed, or discoloured before the operation, its replacement may not put a stop to the diseased processes caused by the stricture: the inflammatory disorder may still go on, and extend to the sound portion of the canal. The case of the negro, related in the preceding section, exemplifies this remark; it should teach us to watch the progress of the case carefully, and, if the symptoms threaten inflammation, to adopt immediately the proper measures.

An irritability of the stomach, and tendency to vomiting remaining after the operation, may be remedied by the effervescing saline draught combined with opium. If diarrhœa come on in the course of the cure, the latter medicine with cordials deserves our greatest confidence*.

On the continuance of the symptoms of strangulation after the operation, the reader is referred to Sect. II. Chap. VIII.

* Dr. Hull mentions an instance in which the testis and spermatic chord sloughed after the operation, although it was not known that the artery had been divided. We can understand from the variations in the course of the chord, that it might be divided without the operator being aware of it.

Med. and Phys. Journal, v. 11.

Section VII.

Proceedings designed to promote the radical cure.

It has been sometimes proposed, to combine with the operation for strangulated hernia, such proceedings as appeared likely to promote a radical cure of the complaint. A ligature has been placed on the mouth of the sac, and the sac itself has been dissected away. The combination of these processes was successful in two instances of irreducible but not incarcerated ruptures, operated on by Schmucker*. The latter completely failed in the hands of Mr. Cooper. The ligature, when employed by Petit, produced such alarming symptoms, that its removal was thought proper; after which they ceased. The irritation, which a ligature may be expected to produce, in the peritoneal surface of the hernial sac, and the facility with which inflammation would be propagated, by the continuity of surface, to the cavity of the abdomen, are the sources of the danger, which attends this

* These cases have been already alluded to, p. 90—91.

proceeding. I have already noticed the proposal of RICHTER; that of scarifying the neck of the sac, in order to produce adhesion of its sides*. He seems to have found this successful in practice; and its performance cannot apparently be attended with the risk of any unfavourable consequence. One remark may be made on all these methods; viz. that they cannot operate on the cause of the complaint. The frequent return of ruptures after the operation must be ascribed chiefly to the dimensions of the ring being enlarged by the incision. This state of the parts will not be at all affected by the obliteration of the mouth of the sac. Yet it must be acknowledged, at the same time, that a recurrence of the complaint will be less probable, if the opening in the peritoneum be obliterated by adhesion, than if it still continue pervious.

SECTION VIII.

Mode of operating on large Herniæ.

OUR proceedings in operating on a strangulated rupture must be somewhat modified by the cir-

* See Section IV. of this Chapter, p. 219.

cumstances of the case. The operation, which has been just described, would not be advisable in a large, old, and adherent hernia. The separation of the preternatural connexions is often extremely tedious and difficult; and the violence, which must necessarily be inflicted in executing this part of the operation, renders the subsequent occurrence of inflammation extremely probable. The extensive surface, which must be exposed by laying open the whole of a large hernial tumour, constitutes a source of great danger to the patient, who in these cases is generally advanced in years, and therefore less able to withstand an extensive inflammation and suppuration. In addition to these circumstances, we must recal to our memory the fact stated in the third chapter, of the impossibility, which sometimes occurs, of keeping the returned parts in the abdomen, after they have resided for many years in a hernial sac. We must likewise consider, that the ring is so much dilated, that the hernia will certainly form again, and consequently that there can be no expectation of a radical cure from the operation. These reflections will induce us to adopt the practice of removing the stricture without opening the tumour. The operation will be performed by making an incision of two or three inches in length through the integuments over the abdominal ring. We then dissect down to the fascia,

which covers the hernial sac, and make an opening in that fascia. This allows us to pass a grooved director under the tendon; and the probe-pointed bistoury may be conducted, by means of the groove, to the part that requires division. If great difficulty should be experienced in accomplishing our object in this manner, a small aperture may be made in the sac near the ring, which will enable the surgeon to divide the tendon with ease. When the parts are thus set free, they should be returned into the belly by pressure on the swelling, if adhesions do not prevent this; at all events they generally admit of being replaced in part. The sides of the incision should be carefully approximated by means of sticking plaister; and they will probably unite by the first intention:—an event which could not be very reasonably expected, if the operator followed the advice of a writer, who recommends that the skin should be *accurately stitched* by means of stitches placed at a finger's breadth from each other.

We thus accomplish the only rational object, which the performance of the operation can be expected to attain; that of rescuing the patient from the dangers attendant on the strangulated state of his rupture: and we accomplish it by a method attended with the least risk. The return of all the viscera could be effected only at the

great hazard of the patient's life; and would be attended with no corresponding advantage, as their subsequent protrusion, after a longer or shorter interval might be anticipated with considerable confidence.

A case, which completely illustrates the foregoing observations, is related by Mr. Cooper*. The swelling, which reached half way to the knees, had existed from infancy, and never admitted of complete replacement. The presence of a constant cough rendered it probable, that, if the parts were returned by the operation, they would be forced out again. Mr. Cooper therefore divided the stricture without opening the sac: this enabled him to return a portion of the prolapsed viscera. The strangulation was completely relieved, and in a few days the person, who was fifty-four years of age, had perfectly recovered. The same gentleman has furnished us with an instance of the fatal effects of a different conduct. Strong and general adhesions rendered the separation and replacement of the parts, contained in a large strangulated ventral rupture, impracticable: inflammation speedily followed the exposure of the tumour, and the patient perished in thirty-seven hours†. The following case affords another

* Pt. I. p. 45 and 46.

† P. 46.

proof of the advantages of the proceeding, which I have recommended in these instances. The favourable termination must be entirely ascribed to the discrimination and judgment of my respected friend, Mr. CROWTHER, surgeon of Bridewell and Bethlem hospitals, who suggested the mode of operating, and did me the favor of communicating the particulars.

CASE.

THE operation for strangulated hernia was required in an old and neglected scrotal rupture, which exceeded in size a quart decanter. Mr. CROWTHER, who had just perused MONRO's work on the Bursæ Mucosæ, immediately perceived that this was a case precisely adapted for the doctor's method; and accordingly advised its adoption. On making an incision down to the ring, it appeared, that the contents of the rupture were not pressed on by the tendon of the external oblique. A small opening was therefore made in the sac, in order to ascertain the state of parts within: no sooner was the cavity penetrated, than a bloody fluid issued from the opening with considerable force; a guggling noise was heard, and the intestine went up spontaneously. A portion of omentum, which remained behind, was

reduced without difficulty, and the wound united by the first intention.

The advantages of operating without opening the hernial sac are so great in all cases, where the tumour exceeds a moderate size, that I strongly recommend its adoption in all such instances.

The honour of proposing this mode of operating belongs exclusively to JEAN LOUIS PETIT; and it is merely for the purpose of performing an act of justice to the memory of this very able surgeon that I add the few following remarks. In the first edition of his work on the operations of surgery, published in 1719, GARENGEOT mentions a case of crural hernia operated on by PETIT without opening the sac, in the preceding year. The latter writer recommends the method in those cases to which it is certainly most applicable, namely, large and adherent herniæ.* But he advises also its more general employment; excepting those cases only in which mortification has occurred, or the parts have become adherent,

* *Tr. des Mal. Chir.* t. 2. Chap, 7. § 12. "De l'operation que l'on fait aux grosses hernies." This posthumous work was not published until 1774; but as PETIT died in 1750, and has stated in his book that he had operated on herniæ in this way more than thirty years before, his claim to originality may be sufficiently vindicated.

or the intestines contain a foreign body*. The object of the operation being to liberate the protruded parts from the stricture which they suffer, does not, he says, require that the sac should be opened; and he regards it as a peculiar advantage of this method that the viscera are not exposed to the air†. MAUCHART‡, HEISTER§, SHARP ||, and others, have considered the proposal of PETIT, and not thought it deserving of approbation. Yet RAVATON** brings it forward as an entirely new proposition, in his treatise on gunshot wounds, in 1750; and assures us that he had employed it in three cases with the greatest success.

The method of PETIT has met with a very zealous advocate in Dr. MONRO*†: but its author

* § 9.

† "Il est même trés avantageux d'eviter cette operation "(opening the sac), parce qu'on n'expose point les parties a "l'air." p. 373.

‡ *Dissertatio de herniâ incarcerata*; Tubing. 1722.

§ *Institutiones Chirurgicæ.*

|| *Critical Inquiry.*

** *Traité des plaies d'armes à feu*, &c. 8vo. Paris, 1750. "Nouvelle façon d'operer la bubonocele." p. 305 et seq.

*† *Description of all the bursæ mucosæ*; or, in Dr. MONRO jun. *Essay on Crural Hernia.*

is accused by this gentleman of not understanding the principles on which its utility is founded, and particularly of not knowing the very mischievous effects produced by the atmosphere coming in contact with the contents of any circumscribed cavity. The reader will be surprised at such an accusation after he had read in PETIT that the avoiding of such an exposure is the chief advantage of his method. I do not mention this from attaching any importance to the opinion concerning the dangerous properties of the air, but because I conceive that the French surgeon has been very unfairly treated in this business*; and I cannot help feeling a wish to clear the memory of a man, who has deserved so well of surgery, from the imputation of practising and advising what he did not understand. His sentiments on this subject will not be found inferior, either in argument or style, to those of the more modern author.

* Dr. MONRO supports his assertion concerning PETIT's ignorance of the true principles, on which the utility of his operation is founded, by a quotation, which the reader must have perceived to have no connexion with the subject; and he will accordingly find that the passage in question is taken from a section of PETIT's work, in which he is speaking on a point altogether different. It must be regretted that a misrepresentation of this nature should not have been corrected in the republication of Dr. MONRO's Remarks in his son's Essay on crural hernia.

Section IX.

Operation where the Tumour has not passed the Ring.

In the case, where the viscera, having entered the upper opening of the ring, are strangulated by its sides, without having descended through the ring of the external oblique, the aponeurosis of the latter muscle must be divided, in order to expose the tumour. A longitudinal incision, beginning above the swelling, should be carried over its middle, and the cellular substance should then be dissected, so as to expose the tendon. When a small opening has been made in the latter, a probe or director may be introduced, and will enable us to extend the cut sufficiently to bring the tumour fairly into view. When the sac is laid open, the edge of the transversus and obliquus internus may be divided either upwards or towards the spine of the ilium; because the epigastric artery, in this case, is constantly found at the inner edge of the mouth of the sac.

CHAP. XII.

OMENTAL RUPTURES.

MANY of the circumstances peculiar to these ruptures have been already mentioned in the preceding chapters; and it would be a mere repetition to consider those points again.

The omentum has been protruded at the abdominal ring, and under the crural arch of the same subject; at the ring and navel; and at both rings.

The characteristic symptoms of epiplocele are mentioned in the third chapter. The tumour, when incarcerated, is very indolent, and will bear considerable pressure. It is in some cases very difficultly distinguished from other complaints: the distinction between it and cirsocele has been fully explained in the tenth chapter. After long residence in the scrotum, it becomes thickened; and it has been in some cases almost separated from the abdominal cavity by the pressure of a truss. Such instances have probably given rise to the observations, in which individuals have been said to possess three testicles. The diagnosis

is often very difficult, where an omental rupture is complicated with cirsocele, hydrocele, or enlarged testis. The most accurate examination of the parts will not always disclose the nature of the swelling under such circumstances. As the two disorders seldom begin together, a history of the progress of the tumour will much facilitate our discrimination.

The danger and inconvenience of an epiplocele are generally less than those of an intestinal rupture, in consequence of the comparative insensibility of the omentum. Yet the apparently harmless nature of the complaint should not lead us to disregard it; since, besides the risk of its incarceration, it exposes the patient constantly to the occurrence of an enterocele. The connexions of the omentum to the stomach and colon are a further source of suffering, from the irritation produced by its dragging on these viscera. Hence arise in certain cases nausea, vomiting, colic, want of appetite, and painful feelings, which are often relieved by bending the trunk forwards. As a very small rupture may occasion these symptoms, a careful examination of the abdomen is necessary in obstinate affections of the viscera.

As the omentum very readily contracts adhesions to the sac, it is important to reduce it early, and to confine it within the abdomen by means of

a truss. The increased bulk of the part in old ruptures, and particularly in fat subjects, renders such cases more especially adapted for the treatment by rest and depletion, described in the chapter on irreducible herniæ.

Although an epiplocele is ordinarily indolent, considerable pressure or violence will cause pain, inflammation, and suppuration, and even gangrene of the part*. Such effects have been produced by trusses. The inflammation, extending to the cavity of the abdomen, becomes a source of considerable danger. In the most favourable termination an abscess forms, from which pus, with separated portions of the membrane, are discharged. Cases of this description have terminated fatally.

Of all the parts, which form the contents of herniæ, the omentum is found to deviate most frequently from its healthy structure. Indeed it possesses very seldom a perfectly natural appearance, when it has been inclosed for some time in a hernial sac. It becomes considerably thickened below the ring, and hence is firmer to the feel. That part which resides in the neck of the sac is

* See the three first cases in Mr. POTT's observations on ruptures, in his *Works*, vol. 3. A fatal termination took place in the second, from gangrene of the omentum produced by a tight truss. See also PETIT, vol. 2, p. 340—342. LE DRAN, Obs. 63. ARNAUD, *Mem. de Chirurg.* p. 546.

sometimes thickened and indurated, while the portion below retains its natural texture. When it has suffered strangulation for a few days, it often becomes of a dark red or livid colour; and there is an appearance, on cutting it, as if some blood were extravasated in its substance. This I believe is the state which surgeons have generally described under the term of gangrene. An incision into the part, under these circumstances, is not attended with any bleeding. A portion of omentum, when thus diseased, admits nevertheless of being expanded as in its natural state. But it is sometimes converted into a solid fatty mass, where every vestige of the original structure is lost. I have met with it in an old umbilical epiplocele, forming a mere lump of fat, equal in size to two fists. SCHMUCKER mentions instances, where it has constituted in this manner masses of twelve* ounces, and a pound and a half† in weight. POUTEAU‡ gives a case where forty-five ounces were removed in the operation. The induration sometimes proceeds to such an ex-

* *Vermischte Chirurgische Schriften*, vol. III. p. 197.

† Ibid, vol. II. p. 56.

‡ *Ouvrages Posthumes*, vol. III. p. 173. ARNAUD even mentions its forming a mass of 8lb. 13 oz. in weight in an omphalos. *Mémoires de Chirurgie*, tom. II. p. 416.

tent, that its state has been described by the epithets "scirrhous*" and "cancerous†."

To return a portion of omentum, when diseased in the manner which we have now described, would be a very bad practice, for two reasons. It would often require so large an incision of the ring, as to weaken the parts considerably, and thereby increase the chance of a future protrusion. The presence of such a diseased mass in the abdomen would also excite inflammation in the surrounding parts, and thereby bring the patient into a state of danger, not less than that from which the operation had relieved him. This at least was the event in a case recorded by Mr. HEY‡: the subsequent symptoms and the dissection clearly shewed that the patient's death arose from inflammation excited by the replacement of a diseased mass of omentum. In another case, recorded by the same surgeon§, a diseased portion of this membrane, which had been returned into the abdomen, was found upon dissection completely mortified; and would probably have caused the patient's death, even if the returned intestines had not become gangrenous. The dan-

* COOPER, page 32.

† POTT's *Works*, vol. III. p. 253.

‡ *Practical Observations*, p. 172.

§ Ibid. p. 217.

ger arising from the replacement of diseased omentum is further exemplified in an instance related in the tenth volume of the Medical and Physical Journal.* A portion of this organ, described as being of a "livid black colour" was returned into the abdomen. Violent inflammatory symptoms, attended with constant vomiting and restlessness, appeared soon after the operation; and every thing indicated the most unfavourable termination. An abscess formed, from which four pounds of matter, together with a sphacelated portion of omentum, eight inches long and two broad, were let out; and the patient recovered.

Various proceedings have been employed in the management of such diseased pieces of omentum, as surgeons have thought it wrong to return. They have placed a ligature on the root of the altered part, removed the substance below this, and then returned the remainder into the cavity of the belly, retaining the ends of the ligature on the outside. It happens too frequently in the practice of surgery, that an unfounded fear of hemorrhage causes the ligature to be used under circumstances, where the knife alone would answer every reasonable purpose. It must be some vain apprehension of this kind,

* Robertson, *Case of hernia congenita*, p. 33.

that has induced operators to tye the omentum, previously to retrenching the diseased part. The consequence of this practice is an inflammation of the omentum, extending within the abdomen to the stomach and transverse arch of the colon. This is the circumstance, which, represented in several cases by the best surgical writers, militates so strongly against including the omentum in a ligature; and a case, which I shall presently produce, tends to reprobate it, if possible, still more. What can indeed be more contrary to reason, than the practice, which we are now considering? The symptoms, which oblige us to operate, arise from the pressure of the ring upon the omentum: no sooner have we freed the part from this stricture, than we subject it to a more close one: for the ligature does what the ring did before; and evidently produces the effect more completely. If strangulation of the omentum by the ring may cause dangerous and mortal consequences, how can we expect that these should not follow when the ligature is the cause of stricture?

CASE I.

A WOMAN, not less than sixty years of age, was sent into St. Bartholomew's Hospital, May

28, 1800, by Mr. Blair, with symptoms of a strangulated umbilical hernia. According to her own history she had been pregnant about twenty-three years previous to her present indisposition. When, as she was suffering much from labour-pains, a tumour made its appearance at her navel. At first it was about the size of an orange, but never being sustained by bandage, it increased slowly till it acquired a very considerable magnitude. It had continued for that long space of time without any particular inconvenience to her, if we except those occasional attacks of colic, diarrhœa, and vomiting, to which most persons (especially those advanced in life) afflicted with this kind of hernia, are so peculiarly liable.* Eleven days, however, before her admission into the hospital, the tumour, already very large, grew still larger, became extremely painful and tense, and a tenderness extended over the whole surface of the belly; all this while she had had no evacuation by stool, there was continual nausea and vomiting; and her pulse was frequent and small, with thirst and other febrile symptoms.

Surgeons are well informed that the existence of an epiplocele (as it will afterwards appear that this originally had been) constantly renders per-

* Pott, vol. II. p. 167.

sons so afflicted very subject to the protrusion of more of the contents of the abdomen. This was precisely the unfortunate circumstance that had happened in the present instance; for though our patient had lived tolerably comfortable for twenty-three years, with almost the whole of the omentum in a hernial sac, yet in the end a small piece of the intestine happening to slip down, converted the disease into an entero-epiplocele, and being in an incarcerated state, gave rise to all the urgent symptoms of the last eleven days.

It must be acknowledged, that in many cases of exomphalos it frequently becomes a matter of the greatest difficulty to ascertain, whether the bad symptoms arise from strangulation, or from other affections of the abdominal viscera, with which persons, having such herniæ, are so much troubled; but in the one before our consideration the difficulty appears to have been less: for the sudden increase and inflamed state of the tumour, the long duration of the symptoms, and particularly of the suppression of stools, sufficiently indicated the nature of the case. The operation was performed in the evening, and the division of the integuments and hernial sac brought into view a very large mass of thickened and indurated omentum, which adhered so firmly to the whole internal surface of the sac, that a great deal of dissection was necessary to separate them. Be-

neath the omentum a strangulated portion of the jejunum was discovered, about five inches in length. The intestine was returned into the abdomen without making any division of the parts through which it had come out, and the large mass of diseased omentum, that composed the great bulk of the hernia, remained at the disposal of the surgeons.

The operator placed a ligature round the root of the protruded omentum. The great sympathy between this part and the stomach was conspicuous to every observant spectator; at the moment that the ligature was drawn the patient's agony was heightened, her vomiting instantly recurred. But this momentary increase of pain and sickness is only a matter of trifling importance, when we contemplate in a comparative view other more permanently pernicious and frequently mortal effects of this practice. It is the succeeding inflammation of the epiploon that ought principally to excite alarm.

The operator next proceeded to amputate what remained of the omentum below the ligature, which might be about three quarters of all that was protruded, and the rest was left with the ligature in the hernial sac unreduced. The patient, soon after the operation, had stools, but the pain at her stomach was excruciating, and her vomiting soon returned and became incessant: her nights

were restless, and finally, after lingering eight or nine days, she died: a little before her death a portion of the integuments, which formerly contributed to envelop the hernia, sloughed. Her body was examined in the presence of many of the pupils of the hospital, when the usual and fatal effects of the ligature were seen. Within the abdomen the omentum was in a gangrenous state, and inflammation had extended to the colon; all the rest of the abdominal viscera had a healthy appearance.

CASE II.

I HAVE lately seen another instance, in which a large mass of omentum, contained in a strangulated scrotal rupture, was included in a ligature. The patient died so soon after the operation, of inflammation of the bowels, that the effects of the ligature could not be sufficiently displayed: yet the state of parts, ascertained by dissection, renders it probable that the consequences of this practice would have been very injurious had the patient survived. The omentum was collected by the ligature into a thick mass, tightly stretched over the intestines, and manifestly dragging on the stomach. If it had become fixed by adhesion in this state, may we not reasonably conclude that

the irritation of this unnatural connexion would have produced the most distressing effects on the stomach? The part, round which the ligature was placed, had ascended about three inches within the abdominal ring. Hence the portion of this viscus below the ligature would have sloughed within the abdomen, and the patient must have encountered no trivial risk from this source.

An observation, published by POUTEAU, shews us how much danger we ought to apprehend from including the omentum in a ligature; and, as it supports the truth of the opinions, which I have delivered on this subject, it may be proper briefly to annex the particulars. The operation for bubonocele had been performed on a young man twenty-five years of age; it was not difficult, after releasing the intestine from stricture, to return it, apparently in a sound condition. A portion of omentum, which had accompanied it, was too large to be replaced without carrying the incision too far: wherefore POUTEAU determined to employ the ligature, and extirpate it. Soon after the operation, the vomiting, caused by the strangulation, ceased, and the patient had stools; but in a short time he complained of an acute pain at the stomach: the whole surface of the abdomen became extremely tender, and he

expired thirty-six hours after the operation, although all the medical assistance had been afforded him, that his situation demanded. On opening the body, the omentum was found sloughy through its whole extent, and had contracted adhesions to the peritoneum*.

In the third volume of Mr. Pott's works we find a relation of three† cases, where the omentum inflamed and became gangrenous in consequence of a ligature upon it; all which terminated in death. The mind of this celebrated surgeon was so deeply impressed with the fatality of the practice, that he declares his intention never to employ the ligature again.‡ Two other examples of the fatal effects of the ligature may be found in the third volume of the *Memoires de l'Academie*§.

It has been a question in the academy of surgery at Paris ||, whether, before returning the

* Sabatier *de la Médécine Operatoire*, tom. I. p 23.

† Page 259—266.

‡ "As I am by repeated experience convinced, that a "portion of the omentum, however large, may be extirpated "with perfect safety, without being previously tied, I shall "never practise nor advise the ligature," Pott's *Works*, vol. III. p. 259.—See also his remarks on the same subject, vol. II. p. 133.

§ Pages 73 and 399, 4to. edition.

|| See two memoirs on this subject, in the third volume

omentum into the abdomen, there was any necessity for tying its cut edge. Many observations on the human subject, and several experiments on dogs shewed that no danger arose from its being replaced without a ligature, and that the practice of tying it often produced injurious consequences. This our illustrious countryman SHARP had already determined by his own experience; he had constantly practised the excision of the omentum without a ligature, having found the apprehension of bleeding perfectly groundless*. We must then conclude, that, if SHARP and POTT, two of the ablest surgeons this country can boast of, never experienced any trouble from hemorrhage of the omentum when no ligature was used; if the most enlightened foreign practitioners have met with the same success; and if such pernicious and fatal consequences do follow tying the omen-

of the *Memoires de l'Academie*, by Mr. VERDIER and Mr. PIPELET. That of the former is entitled, "*Sur une plaie dans la capacité du bas ventre; avec des remarques sur la ligature de l'Epiploon.*" p. 367: the latter is "*Sur la ligature de l'Epiploon,*" p. 394. BOUDOU, chief surgeon of the Hôtel Dieu, had so often experienced the bad effects of the ligature, that he was induced to give it up, tom. IV. p. 316. Mr. CAQUE, surgeon to the hospital at Reims, had extirpated the protruded portion of omentum, and returned the remainder without any ligature, in nine cases, with success, ibid. tom. III. p. 407.

* *Critical Inquiry*, p. 35.

tum, as there is abundant evidence to prove to be a fact; certainly, a continuance of the practice can only discover a backwardness among surgeons to listen to the instructions of experience, and a reluctance to countenance the most valuable improvements.*

But let it not be supposed that I mean to advise the returning of the part into the belly, when there is any bleeding from its cut edge. These objections are only applicable to the practice of tying the omentum in a mass: they do not affect the very necessary and proper precaution

* The reader will probably think, that the facts and arguments, which I have adduced on the subject of tying the omentum, justify my unfavourable opinion of that practice. Being supported in these sentiments by the concurrent testimonies of the most able surgeons, I have no motive for suppressing the contrary statements of ARNAUD, whose experience on this particular subject has perhaps never been equalled by that of any other individual. He gives the following general result of his practice. "De plus de huit cents operations de hernies, que "j'ai faites en ma vie, je crois en avoir trouvé plus d'un tiers "avec des epiploceles; et je puis protester qu'il ne m'est "jamais mort un seul malade par la faute de la ligature." *Mem. de Chirurgie*; t. 2, p. 627. Nothing can appear more favourable than this assertion: yet we find that the ligature caused sometimes in the practice of ARNAUD, those unpleasant effects which occurred to other surgeons. After employing two ligatures, he removed one pound and three ounces of omentum. The operation was followed by an extremely pain-

of securing individually, by small ligatures, any vessels which afford hemorrhage. When this has been done, the part may be returned into the cavity, the ends of the ligatures being retained on the outside.

Some surgeons have recommended that the omentum should be left in the wound, particularly in an old hernia, where the parts have been long down. Cases are recorded, which shew the safety of this practice, and which prove that granulations extend over the omentum, and that a firm cicatrix ensues*. This practice, which I cannot

ful and distressing sensation in the epigastric region, nausea, hiccough, and vomiting. Copious bleedings and narcotic remedies were equally ineffectual in subduing these symptoms, which ceased immediately on removing the ligature. It should seem from the following quotation that these effects often ensued, and were relieved in the same way.

" J'ai tonjours employé cette methode, et elle m'a toujours " réussi, excepté dans des occasions, ou j'ai eté obligé de " couper la ligature aussitot que je me suis apperçu que l'orage " se preparoit, sans m'occuper envain de saigner ni de medi- " camenter mes malades. Dés qu'elle est coupée les accidens " cessent." When we consider that the omentum is drawn up into the abdominal cavity, after its replacement, we have some difficulty in understanding how the ligature could be so readily removed.

* Hey, p. 180 et seq. Chopart and Desault state, that when the omentum is irreducible merely from its bulk,

speak of from my own observation, does not appear to me to deserve recommendation. It is attended with no particular advantage, but certainly exposes the patient to the possibility of ill consequences. The omentum left in the wound must be liable to injury, inflammation, or disease; and hence arises a source of danger. Unnatural adhesions, formed by this part, have greatly impaired the functions of the stomach. Cases are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food without bringing on instant vomiting; and even where it has been necessary for all the meals to be taken in the recumbent position, with the trunk curved and the thighs bent*. To avoid the possibility of such afflicting consequences, we should, after removing any diseased portion, carefully replace the sound part of the omentum in the abdominal cavity, that no obstacle may exist to its regaining that situation, in which its connexions with the stomach and colon would naturally place it.

Since then the practice of removing a diseased portion of omentum, of securing the bleeding

they leave it in the wound, and it gradually retires into the abdomen—*Traité des Mal. Chir.* tom. II. p. 269.

* Gunz, *Obs. Anat. Chir. de Herniis. Mémoires de l'Academie de Chirurgie*, tom. III. p. 406.

vessels, and of returning the remainder into the abdominal cavity, has never produced any injury to the patient, nor is likely to be followed by any ill consequence; it must, in the present state of our knowledge, be considered as the most advisable treatment.

CHAP. XIII.

TREATMENT OF RUPTURES, IN WHICH THE INTESTINE HAS MORTIFIED.

Section I.

Symptoms of Mortification and Prognosis.

THE contents of a hernia are often affected with gangrene, when no symptom or appearance existed previously to the operation, which could lead to the suspicion of this occurrence. Here the integuments and hernial sac are perfectly healthy. It happens, however, more frequently, that the superincumbent parts are affected, in consequence of the mortification of the hernial contents; and the integuments are largely included in the sloughs.

The occurrence of mortification is generally shewn by the tumour losing its tension, and becoming soft, so that it pits on pressure; the integuments, which are very red, become livid, and afterwards black in one or more spots, and the

cuticle separates; the cellular membrane is emphysematous; the pain, vomiting, and hiccough cease; the pulse sinks; lastly, the integuments give way, and a discharge of wind and fecal matter in a highly fetid state ensues. When the stricture is very tight, the gut sometimes bursts, and the feces escape into the abdomen. Some times the rupture spontaneously recedes, and fetid stools are passed. The patient is generally exhausted before the complaint has proceeded to this extent; but the powers of nature occasionally support him through this dangerous state, and even effect a complete recovery. Though the numerous instances of these events, which occur in the records of surgery, should lead us to persevere in the use of such means, as may be likely to aid the salutary operations of nature, they ought not to raise any sanguine hope of similar results in general practice, nor lead us to give any other prognostic, but such as would prepare the minds of friends for the fatal termination.

The state of the abdominal cavity, in patients who die with mortified herniæ, is the same as I have described in speaking of strangulation. Vehement inflammation and distension of the intestinal canal above the stricture, extending over the peritoneum in general, attended with partial effusions of coagulating lymph, and of a turbid

fluid, and with universal agglutination of the opposed membranous surfaces constitute the chief features of the disorder. The mortified gut is the centre, from which the inflammation extends: this part almost invariably adheres to the parietes of the cavity, and to the surrounding viscera, as well as to the hernial sac. Other parts of the canal, above the stricture, are not infrequently found in a gangrenous state. The disorder within the cavity is not always so great; and in some instances it is confined nearly to the protruded viscus. On these differences the events of particular cases must in great measure depend.

The probability of a favourable event is much greater in some kinds of rupture than in others. It has often happened, that the strangulation has included a part only of the diameter of the gut. In several cases of this description the feces have been discharged in part only through the mortified opening: this quantity has diminished gradually as the wound healed, and the patient has completely recovered*. If the gangrene has only attacked one or more small spots, the event of the case may be similar. When the contents of the hernia have consisted of the cæcum with

* Many such instances are related by Mr. Louis in his "*Memoire sur la cure des Hernies Intestinales avec Gangrene*," *Memoires de l'Acad. de Chir.* tom. III. See also *Lond. Med. Journal*, vol. X. p. 72.

its appendix, the mortification of these parts has affected the natural course of the feces but little, and a perfect cure has rapidly taken place*. The aid of surgery can effect but little in these cases: we must carefully abstain from all means that might interrupt the salutary operations of nature. The intestine is adherent to the parietes of the abdomen, behind the ring; these adhesions are of great importance in the subsequent progress of the cure, and should therefore never be disturbed. If the intestine has not already given way, we may remove the stricture: where an opening has taken place, we may make such incisions, through the sphacelated parts, as will provide a free exit for the fecal matter. In either case, mild purgatives and clysters will be proper to unload the bowels, and to determine the course of the feces towards the anus. The use of both these means with the latter object, constitutes a very important part of the treatment of all cases of mortified intestine.

The employment of nutritive clysters, and the abstaining from taking food or drink by the mouth, would promote the consolidation of the

* *Edinburgh Med. Essays*, vol. V. art. 33; *London Med. Obs. and Inquiries*, vol. III. art. 8; Hey's *Pract. Obs.* p. 162 et seq; *Edinburgh Med. and Surg. Journal*, vol. II. p. 313.

wound, by cutting off the passage of feces through it. This plan, suggested by ACREL, was found very serviceable in the following case*.

CASE.

A MAN, 26 years of age, was admitted into the royal hospital of Stockholm, for an incarcerated inguinal hernia of the right side. The intestine, when exposed by the operation, not being discoloured, was replaced in the cavity, and the case proceeded favourably until the thirteenth day. Excrements were now observed in the wound; and they soon came altogether by that way. As the means employed for this patient's relief produced no good effect, it was resolved to nourish him per anum, and allow nothing to be taken by the mouth. ACREL had previously introduced his finger with caution into the wound, and states that the affected intestine was the cæcum, in the large cavity of which he could move his finger freely. A clyster was administered every morning to clear the canal; and a certain quantity of broth, with the yolks of eggs was

* *Der Königl. Schwedischen Akademie neue Abhandlungen*, t. 8, p. 36.

injected twice a day, at ten in the morning, and six in the evening. The patient was nourished in this way for thirty-six days, during which time he became thin and weak. When the upper part of the canal was cleared of its contents, pure bile flowed through the wound, producing pain and excoriation, which distressed the patient exceedingly. A spoonful of broth was occasionally given by the mouth, to obviate these effects; and a small quantity of excrement again appeared at the groin. The wound improved in its appearance, and contracted in size: pressure was used, and caustic occasionally applied to the edges. After the opening had contracted, so as to prevent the passage of the feces, a fetid moisture, discolouring the linen, still came through for fourteen days, and then ceased.

Section II.

Treatment where a small Spot only has mortified.

When a larger portion of intestine has descended, it may be affected with gangrene, in one or more spots, the rest remaining comparatively sound; or it may have become mortified through a greater or less extent of its whole diameter.

Various proceedings have been adopted in the former case. We are recommended to leave the gut in the wound, after removing the stricture; in addition to this, some have advised excision of the mortified part*. Others have returned the intestine, retaining it in the neighbourhood of the ring, by a ligature passed through the mesentery, and confined externally by adhesive plaister. The fear of an effusion of fecal matter into the cavity of the abdomen, on the separation of the slough, formed the objection to the replacement of a mortified portion of gut: and the intent of the ligature placed in the mesentery was, to prevent the possibility of this much-dreaded effusion, by keeping the sphacelated part opposite the ring. The foundation of these apprehensions must be carefully examined, before we can fairly appreciate the treatment which they have suggested. Two questions here offer themselves for discussion: whether a replaced portion of intestine leave the ring, and move to some distant part of the cavity? and whether, on the separation of the sphacelated part, an effusion into the abdomen may be expected?

The inflammation, which precedes the mortification of the intestine, is found to extend along the canal, and to agglutinate the neighbouring

* Richter *Tr. des Hernies*, p. 150.

parts to each other, and to the abdominal parietes. Thus the returned gut is mechanically confined to the neighbourhood of the ring, and a complete barrier is opposed to its removal from that part. If adhesions had not formed previously to the operation, which probably is very seldom the case, there is every reason to suppose that they would take place afterwards; for it is invariably found, when a fatal termination enables us to ascertain the state of the parts after death, that the replaced viscera are close to the ring, and are adherent to the surrounding parts. DESAULT states the result of his experience on this point in the most unqualified terms; he has learned from dissection that the portion, which formed the hernia, never recedes from the ring*. The authority of DELAFAYE may be cited in further confirmation of this point. "When the intestine "sloughs after being returned into the abdomen, "we might," says he, "apprehend an effusion of "feces into the cavity; but this fear is ground- "less as the intestine remains opposite the ring: "accordingly the contents of the bowels come "through the wound some days after the ope- "ration†."

When it is proved, that the returned part

* *Parisian Surgical Journal*, vol. II. p. 366.

† *Cours d'Operations de* DIONIS, ed. V. p. 350, note *a*.

remains close to the ring, we may lay aside all fear of effusion into the abdomen. The wound of the operation affords the most ready exit for the fecal matter, which never penetrates into the cavity. We should not, however, be justified in expecting the feces to spread over the abdomen, even if the intestine were not exactly against the ring. PETIT*, in his excellent memoirs on Effusions, has long ago refuted the commonly received notions on this subject, both by facts and reasoning: he has clearly shewn, that the contents of the intestine, or blood, shed into the abdomen, do not spread loosely over the cavity; that the pressure of the respiratory muscles affords the obstacle to such an expansion; that the effused matters, being evacuated in opposition to considerable resistance, are collected in one spot, to which they become confined by the inflammatory agglutination of the contiguous parts, and where they form, what the French call a depôt. We may then safely conclude, as the annexed cases will most clearly demonstrate, that the alimentary matters, effused from a mortified intestine, will find their way through the wound, and not be spread over the cavity.

* *Memoires de l'Academie*, tom. I & II. See particularly the "*Essai sur les Epanchemens du bas ventre*" in the 2nd vol.

If then, we have no reason to fear, either that the intestine should move from the ring; or, that its contents should be effused into the abdomen, there can be no doubt as to the conduct required, where a portion only of the gut is affected with gangrene: we should replace it in the cavity, with the mortified portion towards the wound, and await the result of the operations of nature without interference. A ligature in the mesentery does not seem necessary, but it can hardly be injurious. In these, as in all cases of mortified intestine, the most rigid attention to diet is indispensably necessary. Here too, as in the last mentioned case of mortification, the use of purgatives and clysters is required for the same reasons as were then stated. The termination of the case will be influenced by various circumstances, which can be but very little modified by any efforts of the surgeon. It is an unfortunate circumstance when the opening is in the upper part of the intestinal canal*. The most favourable

* In a case where every thing was going on well, the patient died from want of nourishment; the opening having taken place in the jejunum: Cooper, pt. I. p. 33. A similar instance is recorded in the *Giornale di Medicina*, 6, p. 401. Two cases are quoted in the *Mem. de l'Acad. de Chir.* t. 5, p. 597, from Hoin's *Essai sur les hernies rares*, when the same circumstance led to a fatal termination. Desault ascribes to this cause, the death of a patient, in whom the

termination is, when the alimentary matter, after finding its way for some time, either wholly or in part, through the wound, gradually resumes its natural course. The powers of the patient may sink under the disease, or he may recover under the disgusting and terrible necessity of voiding his excrement for ever after through the wound.

That the conduct, which has been here prescribed, may be followed, not only without any ill consequences, but with the most complete success; that the contents of the intestine, when the dead part gives way, come through the wound, instead of spreading over the cavity; and, consequently, that the replaced part does not quit its position behind the ring, are points completely proved by the following case.

CASE.

Edward Tubbs, a sailor, 22 years of age,

opening took place at the end of the ilium; *Œuvres Chirurg.* t. 2. p. 356. In a case of this kind the surgeon should omit nothing which offers a probability of relieving his patient. The most nutritive kind of food, such as strong soup, jellies, &c. should be taken frequently in small quantities, in order to afford an opportunity for the greatest possible absorption. Broth and milk may also be thrown up per anum.

was admitted into St. Bartholomew's Hospital, under the care of Mr. Long, with a strangulated scrotal rupture. The operation was delayed longer than it would otherwise have been, by the patient's refusing for some time to submit to it: but there were no symptoms nor appearances indicating the occurrence of mortification. When he at last consented, the contents of the rupture were found to consist of what has been termed a knuckle of small intestine. Mr. Long observed when he opened the sac, that the contained fluid had a fecal smell. The ring, which formed a very close stricture, had made a manifest impression on the gut; and a small pin-hole appeared in this part, through which the alimentary matter came. A broad patch of the posterior part of the intestine was manifestly gangrenous; and a smaller portion of the convexity of the fold appeared in the same condition. The gut was returned*; and evacuations were procured per anum, by means of clysters and purgatives. In three days the contents of the bowels began to be partly discharged through the wound; and in a

* I have been informed by Mr. Cooper, that in a case operated on at Guy's Hospital, where a small opening was formed in the intestine, the aperture was tied with a fine ligature, previously to its being returned; and that the patient recovered.

short time they all came that way. The evacuated matter was a light yellow frothy fluid, mixed with flakes of a more consistent kind. It had no fecal smell; and was discharged in less than ten minutes after drinking. It caused great inconvenience to the patient by excoriating the groin; and this was partly remedied by fastening a piece of moistened bladder with sticking plaister close to the edge of the sore, and allowing the discharge to run over this. The general health was perfectly good. In three weeks he began again to have motions per anum, which increased in quantity, while the discharge by the wound was diminished; and this consisted at last of a mere froth. In a very short time the wound had completely cicatrized, and the man was discharged perfectly well.

I have lately seen the appendix cæci returned into the abdomen, when a small part of it had sphacelated; and, as the case is interesting in another point of view, I shall shortly state the particulars.

CASE.

Ann Stillwell, forty-eight years of age, had been subject for some years to a crural hernia, which became strangulated on the third of July,

1809. She was admitted into St. Bartholomew's Hospital on the following evening, opening medicines having been freely administered without producing any effect. As no evacuation could be procured by the repeated employment of calomel with the colocynth pill, in large doses, the operation was performed on the evening of the sixth. The appendix cæci, of which a small spot had sphacelated, with its little mesentery considerably loaded with fat, so as to give the feel of omentum before the operation, formed the contents of this rupture; and it was replaced without any incision of the stricture, although the opening was very small. The progress of the case, subsequently to the operation, was favourable in every respect; and the wound had completely cicatrized on the nineteenth day.

Amyand* found the appendix cæci perforated by a pin in an inguinal rupture. He removed the part, after placing a ligature between the perforation and the intestine; and the patient recovered without any unpleasant consequence.

The fifty-ninth observation of Le Dran† is a case in which the intestine gave way on the eleventh day after its replacement in the abdomen.

* *Philosophical Transactions*, v. 39, p. 329.

† *Observations in Surgery*, p. 200.

The feces came through the wound, and the patient recovered. "Experience," he says, "has "convinced me, that the ligature in the mesentery may be omitted when the intestine has "opened or is ready to open by mortification; "because the inflammation preceding it always "produces an adhesion of the intestine."

In an instance mentioned by Mr. COOPER*, the intestine was replaced, without being confined by a ligature. The feces made their appearance after ten days; and passed for eleven weeks, partly through the wound, partly per anum; at the end of this time their natural course was re-established. Two other facts, in proof of this point, are furnished by PETIT†; and SHARP‡ speaks in general terms of the great number of cases where the feces have been safely discharged through the wound from a gangrened intestine.§

* Pt. I. p. 35.

† *Memoires de l'Acad. de Chir.* tom. II. p. 93 and 94.

‡ *Critical Inquiry*, p. 42.

§ In a dissertation by MALAVAL, "*an tenuium intestinorum vulnus lethale*" two cases are mentioned, in which feces came through the wound some days after the operation; but the patients recovered. HALLER *Disput. Chirurg.* tom. V. p. 77. Mr. WATSON found an oval gangrenous portion of an inch in length, in the intestine, and returned it, keeping the mortified part towards the wound. The feces appeared on the third or fourth day, but took the natural passage very soon after, and the patient recovered: *Med. Communications*, v. 2, p. 102.

I shall content myself with adding to the evidence already adduced, the testimony of DESAULT, whose experience on this point is completely decisive. In operating on an hernia, he found an eschar of an inch in diameter on the intestine. He returned this part, and no subsequent symptoms occurred to denote the separation of the slough. He conceives that the inflammation of the part surrounding the eschar, agglutinated it to the parietes of the abdomen; and that the slough passed along the intestinal canal. But it is not on the event of a single case that he rests the propriety of this practice: he recommends it from the favourable result of his general experience. He has relinquished the loop of thread through the mesentery; "being convinced by "experience, and particularly from dissection, "that the portion which forms the hernia, never "recedes from the ring, and that there is no "reason to apprehend an effusion into the ab- "dominal cavity on the separation of the es- "char*."

Similar instances are mentioned in the French medical Journal entitled *Recueil periodique d'observations*, &c. v. 21, p. 124: in the *Giornale di Medicina*, 6, p. 401: and 11, 25: in the *Neue Abhandlungen der Schwed. Akademie*, 8, p. 36: and in THEDEN, *Neue Bemerkungen*, p. 99.

* *Parisian Surgical Journal*, vol. II p. 366.

Section III.

Mortification of the whole diameter of the Intestine.

In the case of mortification of the whole diameter of the intestine, we are directed to cut away the dead part, to introduce the superior extremity of the gut into the inferior, and to sew them together*. Systematic writers have employed themselves in devising various methods for uniting the divided ends. They have debated whether they should be simply sewed together, or supported by substances of some solidity, in order to prevent any subsequent contraction at the point of union; and disputes have arisen, whether a portion of an animal's trachea†, a cylinder of varnished card‡, or of isinglass§, were the most advantageous method of effecting the desired purpose. These expedients are de-

* Ramdohr in the quotations exhibited in the note at the end of this paragraph.

† Duverger in the *Acad. de Chirurg.* t. 3, p. 188.

‡ Ritsch, *Ac. de Chir.* t. 4, p. 177.

§ Watson in *Med. Commun.* vol. 2.

scribed with such minuteness and formality, that an inexperienced person might suppose they had been all tried in actual practice. They have, however, fortunately been very seldom employed*.

* Some cases, in which the divided intestine has been successfully united by means of sutures, have been laid before the public. RAMDOHR, who first proposed the introduction of the superior into the inferior end of the gut, cured a patient by that process, after the removal of a piece of intestine of a foot in length. (See a dissertation of MOEBIUS in HALLERI *Disp. Anat.* tom. VI, also HEISTER *instit. chir.* p. 817.) A case of a similar kind is recorded in the *Mem. de l'Acad. de Chir.* tom. III. p. 188: another in the *Recueil Periodique*, tom. XXIII. p. 361: and a fourth in SCHMIDT *Dissert. de Ileo*, (see CREUTZENFELD *Bibiioth. Chirurg.* p. 844.) Favourable cases are also mentioned in the *Recueil Periodique*, 21, 260: 26, 448: and 56. In the only instance which I know of its being attempted in this country, it failed completely, although tried twice: see the Case quoted below.

The favourable result of several experiments on the union of divided intestines by means of sutures, in dogs, has afforded an argument for adopting this practice in the human subject. But the cases are not sufficiently analogous to warrant this mode of reasoning. The different effects of injuries and operations on animals and the human subject; the very different state, both of the constitution and part in a healthy dog, and in a man labouring under a strangulated rupture; and the different structure of the intestines in the two cases, render it impossible for us to apply inferences drawn from such experiments to the treatment of a mortified intestine.

See *Mem. de l'Acad. de Chir.* t. 3, p. 190; Mr. WATSON's

I have no hesitation in rejecting entirely all such proposals. By drawing the intestine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure chiefly depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced by handling and sewing an inflamed part. We accordingly find, that in one of the very few instances, where suture of the intestine has been practised in the human subject, the surgeon was compelled to remove the threads; and that a second trial on the same patient met with no better success*.

" case of femoral hernia with practical observations" in the *Med. Communications*, v. 2, p. 102: the 11th chapter of the first part of Mr. COOPER's work, in which several experiments, made chiefly by Dr. JOHN THOMSON of Edinburgh, are detailed, and the 2nd part of that work, p. 88: also an inaugural Essay by a Dr. SMITH, published, I believe, in America.

* COOPER, Pt. I. p. 36. In the second part of his work Mr. COOPER has mentioned two other instances, in which suture of the intestine was practised. In one of these the feces came through the wound from the time of the operation; in the other no discharge took place, either per anum or through the groin, till some time after the operation, when an evacuation through the wound greatly relieved the patient, p. 30 and 31.

PLOUCQUET's *Bibliotheca* affords the following notice of an unfortunate attempt at uniting the ends of a mortified intestine. " Infauste tentata reunio marginum intestini sphacelati rescissi, " per chartam vernice obductam. AYRER in LODER's *Journal* " *für Chirurgie, &c.* b. 1, p. 526." The same method met

If a surgeon should think proper to remove the mortified portion of intestine, and to unite the divided ends, the simple plan of approximating the edges by means of three or four sutures, placed at equal intervals, would be preferable to any more complicated method.

When the intestine above and below the mortified part is not adherent, La Peyronie has recommended, after the removal of the dead portion, that a ligature should be placed in the mesentery so as to draw this part into a longitudinal fold, and thereby approximate the two ends of the gut. He fastens this ligature on the outside of the wound, in such a manner as to retain the open extremities near the ring. The successful event of some cases treated on the above plan, seems to justify the principles on which it is founded*. If indeed its employment

with no better success in the hands of the French surgeon Boyer. After removing four inches of mortified intestine, he introduced the upper into the lower extremity over a cylinder of card. The manœuvre was very difficult; and the return of the part, when thus distended by the foreign body, required a fresh incision of the ring. The patient, who had before been tolerably easy, was now attacked with the most severe pain, which continued for sixteen hours, when he expired. Heyligers, in *Mem. de la Société médicale d'emulation*, tom. 1, p. 127.

* *Mémoires de l'Acad. des Sciences*, année 1723. *Mémoires de l'Acad. de Chir.* tom. I. "Observations avec des "reflexions sur la cure des hernies avec gangrene." p. 337.

be restricted to those cases, in which the intestine is perfectly inadherent, (which are, I am convinced, of extremely rare occurrence) it is not liable to any objection; and certainly possesses the merit of retaining the ends of the intestine, in such a relative position, as must facilitate their union.

A different treatment has been proposed by LITTRE*; he retained the superior extremity of the intestine in the wound, and tied the lower. This plan has gained the approbation of Mr. LOUIS†, who considers it as preferable to the proceeding of LA PEYRONIE. I cannot think a surgeon justified in directing his treatment expressly to the formation of an artificial anus; and thereby depriving his patient of all chance of that entire recovery, which the powers of nature have accomplished in so many instances. This practice, in its complete success, can only gain the credit of rendering a person disgusting to himself, and to those with whom he associates. It really becomes a question, whether life itself be desirable, if burthened with such an afflicting infirmity as the discharge of the feces through the groin.

* *Mémoires de l'Acad. des Sciences*, année 1700.

† *Mémoire sur la cure des hernies intestinales avec gangréne* in the *Mém. de l'Acad. de Chir.* tom. III.

After thus objecting to the various modes of treatment, which have been proposed for a mortified intestine, it remains for me to mention the conduct which a surgeon should pursue in such a case. This is to dilate the stricture, and to leave the subsequent progress of the cure entirely to nature. The sloughs will be cast off; the ends of the gut are retained by the adhesive process in a state of apposition to each other, the most favourable for their union; the wound contracts, and often completely closes, so that the continuity of the alimentary canal is perfectly re-established. The interference of art can only be prejudicial in this process. When we consider the loose state of the intestinal canal, in its natural condition, we find a difficulty in conceiving how its continuity can be restored, after considerable portions have perished: yet indubitable proofs of this fact exist, and induce us to place confidence in the resources of nature.

In accounting for the union of the divided ends of an intestine, the fact of their being connected to the surrounding parts by adhesions must be borne in mind. If the ends are near each other, and placed so that their axes would form one straight line, there is no difficulty in comprehending how they may be united by granulations. The circumstances are less favourable when the open extremities are more distant, and

when they form an angle: and the prospect of union is diminished in proportion to the smallness of the angle. As the uniting medium must consist of granulations, the contraction subsequent to the process of cicatrization affects the diameter of the canal at this part. The appearances exhibited on dissection are such as this view of the process would lead us to expect: viz. adhesion of the gut to the abdominal parietes, diminution of its diameter, and a greater or smaller angle at its junction*. As the edge of the opening in the intestine is every where adherent to the surrounding parts, the formation of the cicatrix may re-establish the continuity of the canal, although

* Cases of herniæ with mortification, which have recovered, and been afterwards examined, are described in the following works.

Giornale di Medicina; t. 6.

Hist. de la Soc. roy. de Medecine; t. 4, p. 321. The account is accompanied by two figures.

The passages cited from the works of De Haen and Mauchart in the next note.

Morand, *sur la réunion des deux bouts d'un intestin, une certain portion du canal etant detruite:* in the *Mem. de l'Acad. des Sciences,* année 1735.

Pipelet, *sur la reunion de l'intestin, qui a souffert deperdition de substance dans une hernie avec gangrene;* in the *Mem. de l'Acad. de Chirurgie;* t. 4, p. 164; with two figures.

A case in which the colon had united after a gun-shot wound, was examined by Amyand, and exhibited similar appearances. *Philos. Transact.* v. 39, p. 336.

the sides of the gut itself are not brought into contact.

Almost all the numerous instances of recovery from mortified hernia, which are recorded in the annals of surgery, took place where the surgeon was contented to remain a quiet spectator of the process, without interfering with any artificial means of uniting the divided intestine*. Perhaps the only step, which would be justifiable, is that of making an incision in the sphacelated

* Petit *Traité des Maladies Chirurgicales,* tom. II. p. 317 et 399.—*Supplément au Traité de* Petit, p. 116.—Pott's *Works,* vol. III. p. 319.—Amyand in the *Philos. Transact.* v. 39, pp. 338, and 341. *Hist. de la Soc. Roy. de Medeci e,* t. 4, p. 321.—*Memoires de l'Academie de Chirurgie,* tom. I. p. 603; tom. III. p. 178 et 181.—*Memoires de l'Acad. des Sciences,* année 1723, p. 30; année 1735, p. 249.—Mauchart, *Dissert. Chirurg. de Epiploenterocele crurali incarceratâ, sphacelatâ,* &c. in Haller's *Disput. Chirurg.* tom. III. —Heister *de Herniâ incarceratâ suppuratâ, sæpe non lethali,* ibid.—*Recueil Periodique,* tom. VI, p. 48: t. VII, 53, 124: tom. XXIII. p. 274; tom. XXXVI. p. 68.—De Haen; *Rat. Medend.* p. 7, c. 4.—Wilmer's *Practical Obs. on Hernia,* p. 82, &c.—Gooch's *Surgery,* vol. II. p. 197 and 203.—Cooper on *Inguinal Hernia,* p. 33.

I have only to remark, that in almost all the instances, recorded in the works which I have now quoted, two or three inches, or still longer portions of the intestinal canal had been destroyed by the mortification, and they all recovered completely. The number of citations might be easily increased, but these are sufficient for my purpose.

part; this will promote the evacuation of the alimentary canal, and afford considerable relief. The following cases are translated from PETIT, as they exhibit the proper method of treating these complaints.

CASE I.

As I was travelling post in Germany, I went, while the horses were being changed, into a room, where I perceived an insupportable stench, which I immediately recognized, although it was mingled with several others no less disagreeable. It was a smell of putrefaction or gangrene that I particularly distinguished: and, on enquiring the cause, a female attendant led me to the bedside of an apparently dying man. The groin and scrotum were in a state of gangrene, and perforated by several openings, giving issue to feces mixed with bile, and containing white clots, which consisted of curdled milk:—forming a tout ensemble highly offensive both to the sight and smell. Having removed the filth, cut away the sphacelated skin and membranes, and discovered the spot at which the intestine had given way, I procured, by the introduction of a canula, the discharge of much liquid bilious matter, from the intestine above the stricture.

The protruded portion of bowel adhered every where to the surrounding parts, especially about the ring. I added nothing, as an external application, to the species of suppurative, which had been already employed; and trusted the rest of the business to nature. Having left directions for the future management of the patient, I promised a visit on my return, to learn the event. I passed through this village, in my way to France, five months after, and found my patient, who had recovered in twenty-eight days, without any fistula, in perfect health.

CASE II.

On another occasion, as I was going by night to La Ferté Sous-Jouarre, the postillion lost his way. Perceiving a light in a neighbouring hamlet, I went to the house of a peasant, to enquire the road, and found his wife on the point of death from an intestinal hernia, which had burst in the sac, and had given issue to a large quantity of fecal matter. Thus at least I inferred from the narrative of the attendant, who informed me that the swelling had increased in size all at once, and that they had heard at the same time a noise, as of water and wind. Being much pressed for time, I contented myself with simply

opening the sac, and the bed was immediately inundated with fecal matter; the discharge being at least eight times as much as the tumour could possibly have contained. The patient was greatly relieved, and the belly subsided: I applied to the part nothing more than cloths dipped in a decoction of the herbs used for clysters, of which they had fortunately an abundant provision, directing that the application should be frequently renewed, and that they should be careful in keeping the patient clean. The husband recompensed my services by conducting the postillion to Jouarre; and I promised to see his wife the next day on my return, but I was unfortunately detained twenty days. The poor man, impatient at my delay, came, on the fifth day, to inform me that his wife continued well, and felt no pain; but that all her stools were discharged through the wound which I had made, and that he knew not with what balm he ought to dress her; he stated further, that the wound, when wiped, appeared clean, but that it was rendered foul by the discharge several times in the day. I recommended a continuation of the same plan, that of applying cloths moistened in the emollient decoction. In six days he again came to La Ferté, and informed me that his wife had been to stool in the natural way, that the discharge through the wound was very slight, but that she felt excessively hungry: I

allowed her a little more soup, and directed a continuation of the same applications. He visited me on the fifteenth day with the intelligence that his wife grew better and better, and that she would not be restrained from satisfying her appetite: the discharge through the wound was in very small quantity, and took place only when she strained in expelling the feces. I ordered a clyster, whenever she felt any inclination to go to stool, in order to dilute the feces, and recommended that she should exert herself as little as possible in their evacuation. On the twenty-second day I set off on my return to Paris, and found the external wound very nearly healed: the opening in the intestine had, in all probability, entirely closed, as no feces had appeared through it for three days. After the expiration of a month I again saw her in Paris, in a state of perfect health: I recommended a truss, in order to prevent any return of the protrusion, which, however, I do not fear so much in cases like the present, as I do in others*.

* *Tr. des Mal. Chir.* 2, p. 317—321.

CASE III.

In a case of scrotal hernia, where the mortification had proceeded to considerable extent, "I performed the operation, after explaining to the relations how much reason there was to fear a fatal event. The exposure of the intestine and omentum was attended with no pain: the former, which consisted of ileum, had not given way, although the strangulation was of nine days standing. After a short deliberation, I determined to make an opening of an inch in length, in the mortified intestine, and fixed on the middle of the protruded part for the situation of the incision. A very copious discharge ensued, from which the patient experienced great relief. I terminated the operation here, not thinking it advisable to dilate the ring, when there were no sound parts to be returned, and the contents of the intestines were discharged with facility; and covered the parts with cloths dipped in the emollient decoction. At the end of five hours the tumefaction had nearly subsided: the patient passed an easy night, and the discharge through the wound was inconsiderable, probably because the stomach and intestines were already completely emptied. On the 2nd day a manifest

line of separation appeared between the living and dead portions, which induced me to remove a considerable proportion of the latter. I still left a part, under the idea that it might retain the ends of the sound gut out of the abdomen, and afford an opportunity of attaching ligatures with the same object; for I had hitherto not perceived that the sound portion had contracted any adhesion to the ring. Suppuration commenced on the fourth day; and the ends of the intestine, attached by the ligatures, began to separate: but, as I found that the gut adhered slightly to the ring, and as it had kept its place, since the operation, without any disposition to withdraw into the abdomen, I made no change in the manner of dressing. The mortified ends of the intestine came away on the fifth and sixth days, and the omentum separated in two days afterwards: the whole wound now looked red and healthy, and granulations appeared on the protruded parts, continuous with those formed in the neighbourhood of the ring and by the integuments. The treatment was still confined simply to cleaning away the discharge, and applying cloths dipped in the emollient decoction. As the patient was weakened by the severe regimen, I added the yolk of an egg to his jelly; on the fifteenth, I increased the quantity of the latter, and allowed another

yolk, giving him leave also, when thirsty, to take a few spoonfuls of decoction of *dogstooth*, (dogs-grass, couch-grass). Hitherto nothing had passed into the intestines below the hernia, and I ventured to give him half a clyster, which he retained. As he felt some rumbling in the bowels on the next day, I ordered a whole clyster of the emollient decoction, with two spoonfuls of oil: this came away, at the end of six hours, with some hard balls of fecal matter, which must probably have remained in the large intestines since the commencement of the strangulation. On the following days he only took half clysters, which being retained, I gave him another whole one: this brought away some scybala, together with much bile; and hence I concluded that something had passed through the small into the large intestines; that the divided ends were beginning to unite, and thereby re-establish the natural course of the feces. From this time I had the satisfaction to observe a daily diminution in the quantity of fecal matter discharged through the wound, and to perceive that the half clysters, which were still continued, facilitated the evacuations per anum*.

I cannot conclude this part of the subject, without adducing, in support of the practice

* Ibid, 399—403.

here recommended, the opinions of two celebrated men, whose acknowledged abilities and extensive experience entitle them to the greatest attention. My readers will be satisfied on this point, when I mention the names of J. L. PETIT and RICHTER: and as their works are not in general circulation in this country, I shall extract the passages to which I allude. After mentioning a valuable and instructive case, PETIT proceeds, "Cette "observation, et quelques autres, que j'ai rap- "portées ci-dessus, prouvent bien que les gueri- "sons, qui paroissent miraculeuses, sont dûes a "la nature plus qu'a l'art. Heureux les ma- "lades, qui tombent entre les mains des chirur- "giens bien convaincus de cette verité : ceux-ci "s'attacheront seulement a eloigner tout ce qu'ils "croiront pouvoir troubler ou interrompre la "nature dans ses fonctions, et n'en auront pas "moins de gloire*."

"There can be no doubt," says RICHTER, in his elements of surgery, "that the surgeon acts "most prudently in leaving the union of a di- "vided intestine entirely to nature; and that all "the artificial methods, which have been hi- "therto recommended, are much better calcu- "lated to disturb, than to aid, her salutary ope- "rations†."

* *Traité des Mal. Chir.* tom. II. p. 403, 404.

† *Anf angsgründe der Wundarzneykunst,* vol. V. p. 346.

A few observations only are necessary on the general management of patients labouring under mortified herniæ. The utility of mild purgatives and clysters, and the necessity of a strict attention to diet have been already pointed out. The powers of the patient are sometimes so reduced by the disease, that he requires to be supported by a nourishing kind of food; here strong soups, and broths, sago, &c. and even wine may be necessary. Bark and cordial medicines may be combined with these. A common poultice, with occasional fomentations, constitutes the best local application; the necessary attention to cleanliness requires that it should be often renewed. When the sloughs have separated, and the dimensions of the wound have diminished, its entire closure may be favoured by approximating the edges with sticking plaister, and making pressure on the part.

If an opening should unfortunately be made in the intestine, in consequence of a rupture being mistaken for a bubo, the treatment will be the same, as when the gut has mortified. "I "was lately concerned," says Gooch*, "for an "elderly man, who had a bubonocele inadver- "tently opened for an abscess, and who, by such

* *Works*, 2, 202. See also *Mem. de l'Acad. de Chir.* t. 3, p. 173: and t. 5, p. 597.

" kind of treatment as advised in the preceding " case, (a hernia with gangrene of the intestine, " recovered by laxative medicines and clysters, " with a restriction to liquid food), was com- " pletely cured. And many years ago I was an " eye witness to such a happy event, or acciden- " tal cure, in an old woman who had a femoral " hernia incautiously opened just beneath Pou- " PART's ligament."

Worms have been discharged, in several cases, through abscesses, from the intestines contained in ruptures. The surgical treatment would be the same here as where the bowels are perforated in consequence of mortification.

The patient, who has recovered from a mortified hernia, with the natural passage of the feces restored, still remains exposed to considerable danger from disorder of the bowels. He should pay the strictest attention to the quantity and quality of his food, since irregularity in these points has caused dangerous and even fatal consequences. Indigestion has sometimes caused the cicatrix to give way; and thereby renewed the discharge of the feces from the wound*. The

* *Recueil Periodique*, t. 6, p. 48. A patient had completely recovered from mortification of the bowel, when an obstruction took place, whish caused the cicatrix to give way. The natural passage was soon re-established. Another person, whose case is recorded in the *Hist. de la Soc. Roy. de*

gut has been known to burst at the point of union, long after the complete recovery, and death has been the consequence*. A patient, under these circumstances, might perhaps be relieved, if the surgeon were bold enough to undertake a hazardous operation. In a person who

Medecine, t. 4, p. 321, survived the operation eight years. During this time the cicatrix gave way and closed again many times. The last attack of this kind was fatal.

* The patient, on whom La Peyronie first tried his method, was subject after his recovery to a colic, of which he died. *Ac. des Sciences*; an. 1723. In a second case, where the opening closed at the end of four months, an abscess formed afterwards under the cicatrix, and discharged some fluid fecal matter, and a small bone. This healed in two months; but the man was afterwards subject to colic. *Acad. de Chir.* t. 1, p. 341. A third patient of the same surgeon, after losing two inches of intestine, had completely recovered at the end of a month, chiefly as it should appear, by means of a very strict regimen. In two months some attacks of colic were experienced; the last and most severe of which was accompanied by very violent vomiting. An acute pain was felt at the cicatrix; the abdomen swelled, and became painful, and death followed on the second day. Examination shewed that the intestine had burst, and given issue to fecal matter, which filled the abdomen, ibid, p. 343. A similar example is related in the 3rd vol. of the memoirs, p. 163; and another by Morand in the *Acad. des Sciences*, an. 1735. Richter saw a patient die suddenly a few weeks after the cure of a mortified hernia. The intestine was detached from the peritoneum, and perforated by a round hole; the abdomen being filled with effused alimentary substance. *Tr. des hernies*, p. 153.

had recovered from a mortified hernia, the feces ceased to pass per anum; nor could any stools be procured: the belly became distended. The surgeon made an incision into the intestine, and, by extracting from its cavity a foreign body, formed on a plumbstone, completely relieved his patient*.

Section IV.

*Artificial Anus**.

The action of the whole alimentary canal on the food is not essential to the continuance of life; and its different parts are not, in this point of view, of equal importance. The process of digestion in the stomach, the separation of the nutritive from the excrementitious parts, and the absorption of the former in the small intestine are indispensible; but the large intestine seems to be little more than an excretory tube for the

* *Journal de Medecine* for June 1787. The case is also annexed by the French translator of Richter to the *Traité des Hernies*, p. 306.

* The *mémoire sur les anus contre nature* contained in the 2nd volume of the *Œuvres Chirurgicales* of Desault gives an excellent account of this subject.

evacuation of the feces; and the entire cessation of its functions produces no material ill consequence. Hence the prospect of recovery, when the continuity of the intestine cannot be restored, depends entirely on the situation of the unnatural opening; is greater in proportion as that is nearer to the inferior end of the canal, and smaller as it approximates to the stomach.

The sides of the aperture in the intestine become consolidated to the circumference of the opening in the abdominal parietes, and the cicatrix renders this union very firm. Thus the most effectual barrier is opposed to the effusion of the intestinal contents into the abdomen. If the wound could be closed, by the approximation of its sides, the deficiency in the intestinal tube would be supplied, and its contents would then pass on in their regular channel as before, unless the two ends were united at such an angle as to produce a mechanical obstacle. (*See the observations on this subject in the preceding section, p.* 284). Hence the essential circumstances of the case consist in an unnatural fistulous opening affording a ready discharge to the intestinal contents; and in an obstacle, which prevents them from taking their ordinary course. The contraction of the tube below the new anus, where it is no longer distended as in its natural state, is a consequence of the complaint favourable to its continuance.

Some have asserted that this contraction proceeds even to obliteration. But this is supported neither by facts nor analogy. The mucous fluid, secreted by the internal membrane, and occasionally voided per anum, would maintain the tube; and the protrusion of the gut from the wound in an inverted state sufficiently proves that it is still hollow. Dissection confirms these arguments, as no instance of obliteration has been recorded.

When the new opening occurs near to the stomach, the food is not submitted for a sufficiently long time to the action of the digestive organs, and it escapes in a half digested state: nutrition is very incompletely performed; and we shall not be surprized at finding the patient become thin and weak, and perish from inanition. *(See the cases quoted in the preceding section, p. 271.)* The matters voided in such cases are not fetid. If the fistulous aperture should be in the lower part of the ileum, in the cæcum or colon, the danger is much diminished. The patient can exercise all his functions, and, with the exception of intestinal affections, to which he will probably be subject, his health and strength are not impaired. Here the evacuations are more fetid, as they have been longer retained. In both cases they pass off involuntarily, since the opening has no sphincter to retain them: and this causes a constant uncleanliness of the surrounding parts,

which can be but imperfectly remedied, with painful excoriation, and the most annoying inconvenience. Generally no feces pass by the anus; but the mucous secretions of the large intestine are occasionally voided, of a whitish colour, and various consistence. DESAULT observed a case in which these evacuations amounted to a considerable quantity.

A singular case is described by my much valued friend, Dr. CHESTON* of Gloucester; where the feces are not discharged through the wound, although there is an opening in the intestine. The latter part can be seen in the bottom of the wound, with its two ends at a distance from each other. The superior extremity propels its contents towards the inferior, which absorbs them: and this process is carried on so perfectly, under the application of external pressure, which has the effect of completing the canal, that nothing escapes.

It will be understood from the preceding section, that the event of cases, in which the intestine is mortified, can be very little affected by surgical interference; and that our efforts should be employed, as far as they can produce any effect at all, in favouring the restoration of the canal. We cannot prevent the formation of

* See the first part of Mr. COOPER's work, p. 36.

an artificial anus, although it is contrary to our intentions: yet, when the continuity of the canal cannot be restored, the artificial opening is the only means of preserving life.

I have already noticed the different views of this subject exhibited by Messrs. Littre and Louis. The former, after removing the gangrened part of the intestine, fixed its upper extremity to the wound by sutures, and tied the lower. This method is defended by the latter, in his valuable paper on the cure of herniæ with mortification, when the intestine is not adherent. He objects to the plan of La Peyronie from the unfortunate cases, in which the intestine has given way after an apparently perfect cure: and considers that the disadvantages of the artificial anus have been overrated. The feces, he observes, must be voided *somewhere*; and the only difference is in situation. External compression will supply the place of a sphincter muscle, and retain the intestinal contents until their evacuation can be conveniently effected. The latter observation is not correct; the feces cannot be retained: and, however ingeniously the case may be palliated, it must be still regarded as one of the most distressing infirmities with which a person can be afflicted.

If the complaint terminates in the formation of an artificial anus, we must endeavour to alleviate those inconveniences, which arise from the

involuntary discharge of wind and feces through the new opening, by supplying the patient with an apparatus, in which these may be received, as they pass off. A receptacle of leather or horn, with its opening placed against the part, and connected to a strap going round the body, has been generally employed*. JUVILLE† delineates a complicated apparatus the construction of which appears more perfect than that of any contrivance hitherto described. An ordinary inguinal truss is made with an ivory pad, perforated in its middle, so as to fit the opening. A tube of elastic gum, furnished with a valve opening downwards, leads from this perforation to a receiver of silver, which is attached by a screw to the lower end of the tube, and lies against the inside of the thigh. The silver vessel may be unscrewed and emptied without disturbing the rest of the instrument. One or two inconveniences might be anticipated from the construction of this pad; that it would

* Such are described by FUNN in the *Haarlem Transactions*, v. 1; and by LE BLANC, *précis d'operations*, t. 2, p. 460. In a case related by MOSCATI, where the new anus was under the right hypochondrium, the feces were received in a tin box from a leaden canula left permanently in the opening. *Mem. de l'Acad. de Chir.* t. 3, p. 177.

† *Tr. des band. herniaires.* Sect. 8, pl. 7 and 8. It is also described in RICHTER *Tr. des H.* p. 169; and with figures in his *Anfangsgründe der Wundarzneykunst*, v. 5, § 427.

either admit the escape of some matters, or produce too much pressure. It seems to have answered well in one instance under the observation of SABATIER, to whom it was referred for examination by the academy of surgery. After it had been used for four months by a patient of the hotel des Invalides, he gave a very favourable certificate* of its effects in removing the inconveniences arising from the discharge of the feces, and enabling the patient to follow his ordinary occupations. A common elastic truss, with a compress of linen under the pad, has been found in some instances more serviceable, than any complicated instrument, in preventing the continual flow of feculent matter from the artificial opening†; and the employment of a piece of sponge‡ has been suggested with the same view: but it is hardly practicable to remedy this inconvenience altogether. It is desirable to keep up a constant pressure on the part, in order to prevent any protrusion of the bowel itself; or, what has frequently happened, a new hernia by the side of the former.

* This is given in the work above quoted.

† *Parisian Journal*, v. 1, p. 193.

‡ RICHTER, p. 169. LOEFFLER found colic and constipation, with excoriation, produced by this treatment. The fluid retained by the sponge accounts for the latter circumstance. These symptoms ceased when the contents of the bowels were allowed to flow unrestrained. Note d, p. 169 of RICHTER.

"The most effectual means," says DESAULT*, "of preventing the eversion of the "intestine, of keeping the opening sufficiently "dilated, putting a stop to tenesmus, and re- "taining the feces long enough for the nourish- "ment of the body, is to place in the opening a "plug of linen, supported by a compress of lint, "and a moderately tight bandage. In this me- "thod the parts cannot be injured or bruised, "and the contents of the bowels are retained. "If a little fluid should escape, the lint will "imbibe it. Some restraint is felt at the first "employment of this apparatus, and slight co- "licky pains may be caused by it: but these "effects speedily subside."

SECTION V.

Prolapsus of the Intestine through the Artificial Opening.

IT happens not unfrequently that a prolapsus of the intestine takes place at the artificial anus; as there is no sphincter muscle to prevent this occurrence by its contraction. These tumours

* *Œuvres Chirurg.* t. 2, p. 362.

are generally more or less conical, contracted at the basis, and perforated near the apex by an opening which transmits the alimentary matter, if the protuberance issues from the upper end, and a whitish fluid or clysters, if it comes from the lower extremity of the intestine. The gut is necessarily inverted, so that its mucous membrane constitutes the exterior surface of the tumour; which is consequently moistened by the mucous secretion. The colour of the swelling is red. Usually it is not very sensible. It is small at first, becomes gradually larger, and has been seen to exceed a foot in length*. Its size varies, being larger in the erect position, and after exertion, and smaller when the subject has been quiet in bed: in the latter state indeed it often disappears.

Since the bowel is protruded in these cases through an opening formed by the cicatrix of the wound, and consequently possessing considerable firmness, it may experience pressure when a larger part is forced down. The tumour increases in size, and becomes livid under such circumstances; and the passage of the feces may be interrupted. A slighter degree of pressure continued for a long

* A protrusion of the colon, measuring sixteen inches in length, is described by SCHACHER in his *Diss. de morbis a situ intestinor. preternat.* in HALLERI *Disp. Chir.* t. III. No. 78.

time may produce thickening of the part; and we can easily conceive that adhesions, rendering the parts irreducible, may arise from the same cause.

The prolapsus may take place either from the upper or lower end of the intestine; or from both. In the first of these cases the feces pass from the middle and most prominent part of the swelling; in the second from the side of its basis; while in the third there are two swellings; from the centre of one of which the evacuations proceed.

The complaint may come on gradually, and as it were spontaneously; or it may be caused on a sudden by any effort, as violent coughing, straining at stool, &c. It does not in general cause any very serious inconvenience, as it can be replaced at pleasure.

CASE I*.

—— JEFFERIS, sixty years of age, has voided all his stools through the groin for about seventeen years, and still retains every external appearance of health and activity.

His complaint was a scrotal hernia of the size of a pigeon's egg, before the occurrence of the strangulation, which terminated in mortification.

* See pl. 2.

John Campbell del.

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The testis of the same side, and a large portion of the surrounding integuments were involved in destruction with the hernia. The progress of the case, during the mortification and recovery, presented nothing that requires to be particularly noticed.

He has never worn any truss, nor taken any measures to obviate the inconveniences arising from the discharge of the feces, except that of keeping always a quantity of tow in his breeches.

A prolapsus of the intestine has taken place through the artificial opening. The projecting part varies in length and size at different times. It was four inches long when I saw it; and the basis, which is the largest part, measured nearly six inches in circumference. This prolapsus never recedes entirely, but is sometimes considerably smaller. It has occasionally protruded to the length of eight or ten inches, being at the same time equal in size to the fore-arm, and bleeding copiously. This is attended with great pain, and only happens when the bowels are much disordered. Warm fomentations, and a recumbent position, relieve in this case, by causing the gut to return.

The projecting part is of an uniform red colour, similar to that of florid and healthy granulations. The surface, although wrinkled,

and irregular, is smooth, and lubricated by a mucous secretion. It feels firm and fleshy, and can be squeezed and handled without exciting pain: it approaches on the whole to a cylindrical form, and its anterior or loose extremity contains the opening through which the stools are voided. The basis of the swelling appears to be continuous on all sides with the integuments, and I could discover no opening of the lower end of the gut, which is probably entirely closed.

This person does not possess the slightest power of holding the stools. They are often voided very suddenly, and, to use his own expression, without giving him any notice. When the feces are fluid, which is generally the case, they come away repeatedly in the day, and are discharged with considerable force: but when they are of a more firm consistence, there is not more than one stool in one or two days, and their expulsion requires much straining. At these times their size is not greater than that of the little finger.

Whenever the urine is retained, after an inclination to void it has been felt, a quantity of clear inoffensive mucus, like the white of an egg, amounting to about four ounces, is expelled from the anus, and this may occur two or three times in the day.

He does not confine himself to any particular

diet. When he is purged, the food frequently passes with very little alteration; this he has noticed particularly of cucumber. He experiences great weakness at such times. Ale will sometimes pass off in five minutes from the time of drinking, having apparently undergone little or no alteration.

The bowels are strongly affected by slight doses of purgatives. A quantity of rhubarb, sufficient to cover the finger nail, will purge for three or four days.

CASE II.

The first opportuniiy which I had, of observing this affection, occurred, says Sabatier*, some years ago in a young man, who had an artificial anus about the middle of the right hypochondrium. There was a round opening of about an inch in diameter, and a somewhat soft and red tumour, equal in size to the fist. The latter had its origin within the aperture, was surmounted irregularly with small tubercles, rather larger than hempseeds, and covered with a mucous fluid. The feces are discharged at its basis, in a

* *Mémoire sur les anus contre nature; Mem. de l'Acad. de Chir.* t. V. p. 592. The case is at p. 599.

liquid and inodorous state. The complaint had subsisted from the age of nine months; nothing coming per anum, except a very little hardened matter of a white colour. The tumour was of more recent date, and was increasing in size. It gave him no pain, although exposed to the air, and frequently washed with cold water. Liquids appeared through the wound unaltered, very soon after they had been swallowed. Pressure occasioned considerable pain. This young man, being prevented by his infirmity from engaging in laborious employments, derived his subsistence from begging in the high road of Antoni, near Verrieres. He is now in Paris, where I have frequently seen him, and find no alteration in his complaint, except that the tumour is elongated.

CASE III*.

In a soldier, who was operated on for an inguinal hernia of the right side, the excrements passed partly through the wound, and partly through the anus. The former, for what motives we cannot conjecture, was kept open by means of a tent introduced at each dressing: and at last the whole of the excrement, excepting a

* Ibid, p. 600.

very small quantity at distant periods, came by this way. About a year afterwards, he experienced, in the hospital at Toulon, a sudden and severe attack of colic, in consequence of eating some boiled chesnuts. Being obliged to go to bed, he found at the wound a red tumour, equal in size to a small nipple; this increased very rapidly to the bulk of the fist. The pains in the abdomen were considerable, and the part grew livid. He was relieved from this attack, a few thin eschars separating from the swelling; at the basis of which the feces continued to be discharged. The prolapsus varies much in size; is ordinarily about six inches long, and one and a half in diameter; and exhibits, very clearly, the folds and glands of the intestine. It is not painful. The feces flow constantly from its basis in a fluid state, without the patient being conscious of their discharge. Small hard lumps, resembling fat in appearance, are occasionaly expelled from the rectum. The patient is in a good state of health, and tolerably lusty and strong.

In the two following cases there was a double protrusion; and a similar instance is related by Fabritius Hildanus*.

* *Cent.* I, obs. 74.

CASE IV*.

A SOLDIER, twenty years of age, received a a sword wound at the battle of Ramillies, under the ribs of the left side. This was extensively dilated; and the appearance of excrement on the following day, shewed that the intestine had been injured. He was confined in his diet to broth with an egg, which was discharged through the wound between one and two hours after being swallowed. He felt extreme hunger, and was clandestinely supplied by a fellow soldier, at the end of ten days, with bread and meat, which he devoured greedily, and retained for ten hours. After the wound had cicatrised, and he had left his bed, two protrusions of the bowel took place, and gradually increased to the length of a span. These are connected at their bases, so that they resemble one gut, joined by its broadest part to the belly, and having two loose dependent extremities. They return into the abdomen, when he

* ALBINI *Annotat. Academ.* lib. II. cap. 8. *De vulnere intestini coli, et quæ id consecuta sunt.* The minute and interesting narrative of this case was drawn up from ALBINUS's own examination, and the history furnished by the patient. A very good representation of the appearances is given in two figures.

lies on the right side; and can be very readily pushed up, by introducing the finger into the aperture at their extremities: but the inferior prolapsus does not ever enter completely. When they are replaced, a large opening under the lower ribs leads into the cavity of the colon; and from this the contents of the canal are discharged frequently and involuntarily; less so, however, when the bowel falls down, as the pressure of the cicatrix then retains them in some measure. If he continues in the recumbent position, or if he rises and remains very quiet, the gut does not descend; but coughing, or any exertion renews the protrusion. The tumours are red, turgid, and covered with mucus; they become paler, flaccid, and wrinkled, when about to pass up. They possess several wartlike prominences, rough, covered with a kind of mucous coat, bleeding when rubbed, disappearing and renewed again in different situations. At one time exposure of the part to cold did not affect it: he had washed it in the waters of the Rhine, when the river was frozen, without inconvenience: latterly, however, cold air coming in contact with the protrusions caused cough. If he did not wash it often enough in hot weather, and was engaged in laborious exertions, a dark and hard mucous and bloody incrustation took place, with pain, loss of appetite and strength:

by lying in bed on the right side, the protruded parts would gradually return, and the pellicle could be easily removed, when they again came down. He had married, and got children: he was robust, when ALBINUS examined him, in the fortieth year of his age. A white mucus was discharged almost daily per anum; and sometimes, particularly if he retained the protrusions within the cavity, a thick tenacious white matter came away with considerable difficulty. He enjoyed the best health when he ate a sufficient quantity to satisfy his appetite. Bread and meat, with a little strong beer, agreed with him best: they were retained nine or ten hours, and always underwent considerable alteration before they were discharged. Bread made of fine flour was the best. Ripe fruits, leguminous, and other fresh vegetables were hardly retained two hours; they were discharged nearly unchanged, sometimes without loss of colour; and not mixed with the other food. But if much fat or butter were taken with them, they would stay longer; even for three days, in some instances. When he drank too much, the protrusions swelled, and much air and liquid came through the superior portion with the excrement: and liquids, taken without solid food, would run off in less than two hours.

CASE V*.

After the removal of a portion of colon, in a case of hernia with mortification, an artificial anus remained, through which all the feces were discharged, excepting some whitish hardened portions, which are still expelled every two or three months. At the end of about eight weeks, the intestine protruded through the wound, and a second protrusion appeared in a few days. They were two or three inches in length, and fifteen or sixteen in diameter; and have remained of the same size. Their colour is a deep red, and the surface irregular. They can be easily replaced, without any pain, but the slightest effort is sufficient to renew the protrusion, particularly in the erect position. Clysters injected per anum pass out immediately through the portion which projects from the lower extremity; and vice-versa. Messrs. Sabatier, de la Martiniere, and Andouille, to whom this person was referred for the purpose of ascertaining whether a cure could be accomplished, advised him to be contented with palliative measures. He wears a truss with a pad

* See the memoir of Sabatier already quoted; p. 618.

made of box wood, which confines the protuberance next to the anus. The upper prominence passes through an opening, formed in the pad; and a silver tube continued from this aperture conveys the excrement into a box of tin.

The valuable memoir of SABATIER*, from which I have extracted three of the preceding cases, contains two instances related by Mr. PUY of Lyons, in which a strangulated state of the protruded intestine led to a fatal termination. Unfortunately the parts were not examined after death.

We should endeavour, in cases of artificial anus, to prevent the occurrence of a prolapsus by pressure on the part; and this is more particularly necessary, when a disposition to its formation appears to exist. If the tumour has become irreducible by the hand, its replacement may be attempted by keeping up constant pressure, while the patient at the same time is confined to bed. When it cannot be lessened by this treatment, some contrivance may be adopted to prevent its future increase; and the patient should avoid all those circumstances which are likely to augment the

* Pp. 622 and 623. See also a fatal case in LE BLANC *Operations*, t. 2, p. 445.

swelling, as great exertions, laborious exercise, irregularity of the bowels, &c. Where pressure of the cicatrix threatens to interrupt entirely the course of the feces, an attempt at relief should be made by dividing the stricture*.

The means, which I have now directed, can be regarded only as palliative; but DESAULT has accomplished in some instances a radical cure. After procuring the return of the protrusion, he places a plug of linen in the opening, which keeps up the intestine, and, by closing the fistula, favours the passage of the feces in their natural course. He endeavours to destroy the angle, formed by the two ends of the intestine, by long pieces of lint introduced into both extremities; which method, by dilating the inferior end, facilitates also the discharge of air or feces. When a sufficient dilatation has been effected, and the internal angle is effaced, the long portions of lint are laid aside, and the linen plug alone retained, with a caution not to introduce it too far, as it would then constitute an obstacle to the passage of the intestinal contents. If this plan succeed, its effects are indicated by the passage per anum, first of air, and afterwards of feces: as the latter increases, the external open-

* This was successfully practised in an instance recorded by SCHMUCKER, *Chir. Wahrnehm.* b. 2.

ing will contract. The use of laxatives and clysters, and a strict regimen, will facilitate our proceedings. Where the angle of junction between the two ends of the intestine is very acute, or where the prolapsus cannot be returned, this method will not succeed. The most favourable case for its employment is in a simple wound of the gut, without loss of substance. The following example, in which DESAULT practised his method with complete success, is so interesting that I insert the whole narrative.

"FRANCIS VIALTER, a sailor, and native of Moulins, was wounded by the bursting of a bomb in the month of May, 1786. He became insensible, and continued in that state for three hours after the battle. The wound was on the right side, and extended from two inches above the abdominal ring to the bottom of the scrotum, where it had exposed the testicle. A portion of intestine, an inch in length, and divided, appeared at the upper part; and was withdrawn into the abdomen, during the washing of the wound. An opening was left in the dressings, in this situation, for the escape of the feces. He was received into the marine hospital at Brest, a month after the accident, and continued there until he was cured;—if indeed that can be called a cure, which left him with a piece of intestine

hanging out of the abdomen, and constantly discharging half digested food.

In this miserable state he worked his way on foot to the place of his nativity. Finding that his friends could not furnish him with the means of subsistence, and that the exertions and fatigues of the journey had greatly elongated the protruded intestine, he visited successively the chief hospitals of Europe, in the vain hope of obtaining relief from his loathsome infirmity. After wandering about in this way for four years, he was received into the Hôtel Dieu at Paris on the 29th of September, 1790.

The protrusion had acquired a considerable bulk. Its form was nearly conical, and it measured nine inches in length: the middle and anterior part was very prominent. Its basis, rather contracted, appeared to proceed from beneath a fold of the skin just above the ring: the apex reached to the middle of the thigh, and possessed a small opening, through which the feces issued. Nothing had passed per anum since the period of the wound, except a little whitish matter, at intervals of three or four months. The surface of the swelling was every where red and folded; and these folds, resembling the valvular productions of the mucous membrane, were particularly conspicuous below. A smaller swelling, similar to the former in colour and consistence, and arising from the same opening, was placed externally to

it. This had an oval form, and a puckered orifice discharging a little serous fluid. Both possessed a kind of peristaltic motion, which could be excited by throwing a few drops of water on them.

This unfortunate young man was of a large and strong frame, but extremely thin, and forced, by the constant dragging which he experienced in the abdomen, to keep his trunk curved, in which position he could walk supported by two crutches. An earthen pot, suspended between the thighs, received the intestinal discharge, which acquired very soon an insupportable fetor.

It was soon ascertained, that the largest tumour arose from the end of the intestine, next to the stomach, in an inverted state; that the smaller was made in like manner from the lower extremity of the bowel; and that the edges of the wounded tube were adherent to the opening in the abdominal parietes, forming with them a common cicatrix.

The depending situation, the exposure to the air, and the irritation produced by the rubbing of the patient's dress, and the constant contact of the discharged matters had considerably thickened and indurated the parts. Yet Desault found, that pressure by both the hands, continued for a few minutes considerably diminished the

swelling. He covered the whole, excepting the opening at its apex, with a simple bandage, carried round circularly from below upwards; and this had become so loose on the evening of the same day, that a renewed application was necessary. A similar renewal was practised, as the part diminished; and on the fourth day the intestine seemed reduced to its natural size. DESAULT now accomplished the entire reduction by introducing his finger into the opening, and pushing it upwards, so as to destroy the inversion. The smaller tumour presented no difficulty.

The patient's condition was already much mended by the return of the swellings. A thick plug of linen, three inches in length, was introduced into the intestine, and maintained there by a proper bandage. DESAULT proposed to remove this twice a day for the evacuation of the feces; but, after some noise in the bowels, accompanied with an acute sense of heat, wind passed by the anus. Colicky sensations and twitching pains in the rectum followed; and half a pint of fluid matter was discharged through the rectum. Eight evacuations of the same kind, preceded by similar feelings, took place during the night, and made the patient rather weak. The stools were very numerous the three following days; but they gradually became thicker, and diminished

in number. The linen plug was discontinued on the eighth day, and the opening was closed by lint and compresses supported by a truss with a broad and flat pad. This plan entirely prevented the escape of fecal matter by the wound.

The young man quickly recovered. He regained his strength, and grew fat, although he ate only one third of the quantity, which he consumed before. During two months, which he spent in the hospital after this time, in order to ensure so extraordinary a cure, the fecal discharge was perfectly healthy, and no inconvenience was felt. A very trivial serous exudation could hardly be said to stain a small bit of lint placed on the fistulous aperture.

This patient was travelling about for five months after he left the hospital, executing all his functions in the most healthy manner, and performing even violent exercises. In endeavouring for a wager to lift a cask on his shoulders, his bandage broke; but, as he felt no pain, he did not attend particularly to the circumstance, and proceeded to accomplish the feat he had undertaken. He continued walking for two hours, after applying his pocket handkerchief as a bandage. The intestine was again protruded, to the length of six inches, through the opening in the abdomen, which still existed. The same

treatment as on the former occasion was again adopted with complete success*."

Section VI.

Fecal Fistula.

It happens sometimes that the wound closes in a case of mortified hernia, with the exception of a small fistulous aperture, through which fecal matter, or a yellow fluid is discharged in small quantity. Such openings often continue in spite of every attempt to heal them. The complaint differs from the artificial anus only in degree. The stools are evacuated in the natural way, but a small ulcerated opening still exists, giving issue from time to time to more or less fecal matter. The discharge may be abundant at one time, and then stop for some days: the opening may be closed for a time, and then re-appear. The matter discharged may be a clear yellow fluid, without any fecal smell. Herniæ are not the only causes

* *Œuvres Chirurg.* t. 2, p. 370 et seq. The case is also related in the *Parisian Journal*, v. 1, p. 178; and another successful instance occurs at p. 370 of the same volume.

capable of producing these fistulæ; they may arise also from wounds of the intestine, or after those abscesses through which worms are occasionally discharged.

"I attended a patient," says MORAND, "in "whom the operation for strangulated hernia "had been performed; and who voided feces "both by the wound and the anus. The dis- "charge by the former passage was gradually "reduced to a little yellow serum (serosité "bilieuse), which the patient continued to pass "through a small fistulous opening. I have "seen two other instances of the same kind*."

"A boy, aged thirteen, was admitted into "St. Thomas's Hospital, for an irreducible "scrotal hernia, from which a quantity of fecu- "lent matter was constantly discharging through "a small hole in the scrotum. He remembered "having accidentally swallowed a pin, and five "weeks afterwards his hernia began to swell, "and to become very painful. A poultice was "applied, and an abscess formed, which soon "after burst, and on looking at the orifice by "which the matter had discharged, the point of "a pin appeared projecting from it, which was "easily extracted. A fistulous opening of the "intestine remained, for which he was admitted

* *Opuscules*, pt. 2, p. 162.

" into the hospital. Attempts were made to " unite it by paring off the edges of the wound, " and encouraging adhesion, but without suc- " cess*."

In the case of a female who had a ventral hernia, from which a portion of intestine sloughed, "the wound has since several times healed; " but at the interval of a month, and sometimes " of six weeks, an abscess forms, and produces a " discharge of purulent and feculent matter for " four or five days, when the wound again closes; " and in this way she has been teased for many " years*."

In treating these fistulæ, we should endeavour, by accelerating the passage of the intestinal contents, to obviate all accumulation in the canal; while the preternatural opening should be so closed as to prevent the introduction of any matters into it. The use of laxatives, combined with clysters, and the employment of easily digested food will accomplish the former object, and determine the feces towards the anus. Pressure on the fistula, by means of graduated compresses, supported by an elastic truss, fulfils the second

* Cooper, pt. I. p. 17.

† Ibid, p. 38. Another case may be seen in De Haen, *Ratio Medendi*, p. 7, cap. 4, § 19.

indication. Confinement to bed should be insisted on; and there is every reason to expect that this plan, if steadily pursued, would prove effectual.

Discharge of Feces without preceding Mortification of the Intestine.

Cases have occurred where no mortification of the bowel was discovered by the operation, but feces have come through the wound at some distance of time afterwards. The following example of this occurrence happened at St. Bartholomew's Hospital.

CASE.

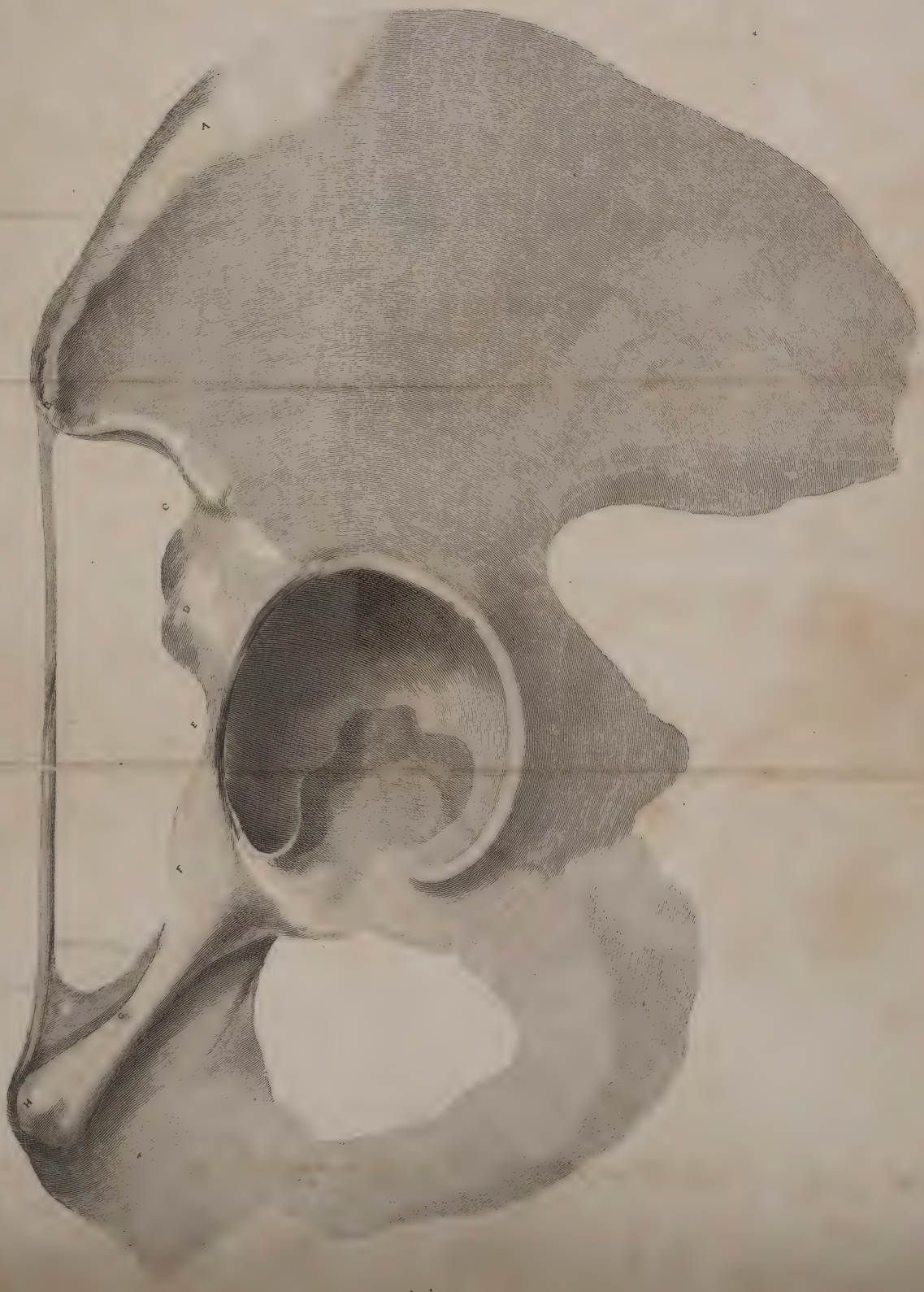
A woman, about sixty years of age, was brought to the hospital for a bubonocele, which had been strangulated two days. The urgent nature of the symptoms induced Mr. Ramsden to operate in about two hours after her admission. The escape of a large quantity of turbid and fetid fluid, when an opening was made in the sac, led Mr. R. to fear that he had injured the intestine, but the subsequent complete exposure of the part proved this apprehension to have

been groundless. The gut, which was much discoloured, was returned without difficulty, but seemed not to have completely re-entered the abdominal cavity. On passing the finger as high as the incision would admit, it did not fairly reach the abdomen, but conveyed an idea as if the intestine, although free from stricture, were contained in a peculiar membranous bag. The patient was found in the evening, with great pain in the belly, an exceedingly quick and weak pulse, and cold sweats over the whole body. Clysters, which had been ordered for her, could not be forced up. After a long examination with candles, &c. some hardened feces were brought away from the rectum; but the low and faint state of the patient had now so greatly increased, that very little hope remained of her surviving even a few hours. On the next morning, to the great surprize of her attendants, she had considerably recovered; her pulse was about eighty, and moderately full; but as no stools had yet been procured, pills of the cathartic extract and calomel were given every two hours. She began to be purged in the evening, and had eight or ten stools before the next morning. Her strength again failed: the pulse could scarcely be felt, and the body was covered with a cold sweat. By the liberal use of strong broth, sago, and wine, she was so far restored in a few days as to

sit up in bed. Her appetite returned, and well-grounded hopes of her recovery were entertained.

For some time after this she exhibited alternately the opposite symptoms abovementioned, according to the state of the intestinal functions. She was seized, in about six weeks after the operation, with violent pain in the lower part of the abdomen, which terminated in two days in a discharge of the feces through the wound, and perfect ease. The appetite now failed, the strength decreased, and death took place on the eighth day from the appearance of the feces in the wound.

On examining the body, the whole of the intestines were found so strongly adherent to each other, that they could not be separated without laceration. A portion of the ilium, the same probably, which had been protruded, adhered to the abdominal ring. Its coats were greatly thickened, and its canal very much contracted. A small ulcerated aperture was discovered in this part; and led, in a fistulous form, through a substance nearly equal in size to the little finger, to the external wound.


A
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CHAP. XIV.

ANATOMICAL DESCRIPTION OF THE FEMORAL RUPTURE.

SECTION I.

Description of the Parts, in which the Femoral Rupture is situated.

THE circumference of the os innominatum presents, at the upper and anterior part of the bone, a large excavation, bounded on the outside by the anterior superior spinous process of the ilium, on the inside by the spine of the pubes, and filled by certain muscles and blood-vessels, which are passing from the abdomen to the thigh. Between the two bony points, constituting the boundaries of this hollow, the inferior edge of the aponeurosis of the obliquus externus abdominis is extended, under the name of the crural arch, or POUPART's ligament. (See plate I.)

This concavity has an oblique position, slanting from behind, forwards, downwards, and inwards, so that one of its boundaries is external

superior and posterior, the other internal, inferior and anterior*. The distance between these is about four inches and a half. The thick and rough margin bounding the circumference of the ilium at its upper part, and called the crista (pl. I. A.), terminates in front by a pointed protuberance (B), separated by a semi-lunar notch (C), from a similar tubercle which is under it (D): these processes are named the *anterior spines* of the ilium; and are distinguished by the epithets *superior* and *inferior*. On the inside of the latter, and over the acetabulum, there is a second notch (E) terminated by a smooth and gentle rising of the bone (F†) beyond which there is another excavation ending at the spine of the pubes (H‡). Beyond the latter projection, the

* In the language of Dr. BARCLAY, the former would be lateral, atlantal, and dorsal: the latter, mesial, sacral, and sternal.

† The cartilage, which joins in the young subject the two separate portions of the os innominatum, called the ilium and pubes, is placed in the middle of this rising: consequently, that part of the general excavation, which is placed laterally with respect to this point, belongs to the ilium, that which is situated mesially, to the pubes.

‡ GIMBERNAT, WINSLOW, and BICHAT call it by this name; SOEMMERRING gives it the appellation of *tuberculum spinosum; de corporis human. fab.* t. 1, § 420. It is the *tuberosity of the pubes* of Mr. COOPER.

edge of the bone is thick and level, extending inwards for about half an inch, and terminated by the symphysis. The point, at which this level horizontal part is continuous with the perpendicular line of the symphysis is the *angle* of the pubes.

To the superior spine are attached the fascia of the thigh, the tensor vaginæ, the sartorius, the crural arch, and the iliacus internus; and to the inferior, one of the tendons of the rectus cruris. The notches C and E are filled by the iliacus internus and psoas magnus, and are continuous behind with the concave or pelvic surface of the ilium. The gentle excavation G is of particular importance. Its surface is smooth, broadest at the acetabulum, and growing narrower towards the spine of the bone; terminated in front by a prominent line, rising over the notch which contains the obturator vessels, and giving attachment to the pectineus, and behind by a sharp and rough ridge, extended backwards and outwards from the spine, and called the crista of the pubes*. On this excavation the crural vessels are placed. The crista is continuous behind with the obtuse

* This together with the following line, forms the *linea ileo-pectinea* of Mr. COOPER. The surface of the bone, at this part, as well as in the smooth hollow which receives the femoral vessels, is covered by a thick and closely adhering ligamentous substance, called by Mr. COOPER *ligament of the pubes.*

line*, which bounds the concavity of the ilium, and contributes with it to form the superior aperture of the pelvis. The space under the crural arch contains, besides the parts already enumerated, the anterior crural nerve, and some smaller nerves, which lie on the surface of the psoas and iliac muscles; the lymphatic trunks of the lower extremity, and one or more absorbing glands.

The surface of the bone between the spine and angle forms the basis of the triangle described by the inferior aperture of the abdominal canal; it is covered by the spermatic chord in the male, and by the round ligament of the uterus in the female subject.

The attachment of the aponeurosis of the external oblique muscle to the os innominatum has been described already in the account of the inguinal hernia: it only remains for me to state more minutely some particulars concerning this part. It is fixed by a broad insertion into the pubes; this attachment, which begins at the spine, runs along the crista of the bone. Its position therefore (in the erect state of the body,) is nearly though not entirely horizontal; consequently its two margins should be described by

* Sometimes called *linea innominata*: the tendon of the psoas parvus is inserted into it.

the epithets anterior and posterior: it being remembered at the same time that the former of these is rather higher than the latter. That part of it which is fixed to the spine of the bone, has the appearance of a firm and somewhat round tendinous chord; its insertion into the crista of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined sharp edge at its posterior margin. The latter division of the tendon must of course be situated much more deeply from the surface than the former. Its sharp wiry edge can be felt very distinctly by passing the finger under the crural arch, on the inner side of the femoral vein, either from above or below.

If we describe a distinct part under the name of Poupart's ligament, we should state, that when it approaches to the bone, it becomes suddenly broader; that it is fixed by this broad portion along the whole length of the spine and crista of the pubes; that it has a rounded and strong anterior edge, a thin and sharp posterior margin, and that the former of these is nearer to the surface, while the latter is comparatively deeply seated. The breadth of this part varies in different subjects: it is generally from three quarters of an inch to an inch. Sometimes, as

GIMBERNAT* has stated, it measures more than an inch. Dr. MONRO† has observed that it is broader in the male than in the female subject; and from this structure he explains in part the more rare occurrence of this rupture in the male. The great importance of this part to ourpresent subject renders it necessary that the surgeon should have a clear notion of the insertion of the crural arch in the pubes; I have therefore had a drawing made to represent the ligament alone, with its two attachments, in order to shew this point distinctly.

The anterior edge of Poupart's ligament represents a straight line drawn from the ilium to the pubes: the posterior border has an arched form‡ towards the latter bone, in consequence of the expanded portion, which is fixed to its crista.

* *Account of a new method of operating in femoral hernia,* p. 34.

† *Observations on crural hernia,* p. 51.

‡ This is sometimes called the crescentic or crescent-shaped edge of the crural arch; and the portion of tendon which forms it has been occasionally mentioned under the name of GIMBERNAT's ligament. We are indebted to this Spanish surgeon for the first accurate description of the part in question; but as it is only a portion of the crural arch, not distinct from the rest, any name which might lead the student to regard it as a separate ligament is objectionable. GIMBERNAT published this essay in 4to, at Madrid in 1793, under the title of *nuevo*

Hence has arisen the appellation used by GIMBERNAT of the *crural arch.*

The parts, which have been already enumerated, fill up the space between the crural arch and the os innominatum. The crural vessels, placed in the smooth slope on the front of the pubes, are situated laterally with respect to each other. Next to the thin edge of the arch is the vein, with the artery lying externally to it. An absorbing gland is sometimes found between the vein and the tendon; or else this space is only occupied by loose cellular substance.

Since the tendon of the obliquus externus is stretched like a cord between two distant points, and there is a wide space under it, the student will suppose that protrusions of the abdominal viscera under its edge must happen very readily. This is effectually prevented by the attachments of certain fasciæ, confining the tendon closely to the surface of the parts, which it covers.

The iliacus internus, and that portion of the psoas magnus, which lies by its side, are covered by a thin fascia, arising insensibly on the surface of the muscles, and intimately connected with the

método de operar en la hernia crural, dedicado al rey nuestro señor Don Carlos IV. The English version quoted above was executed by Dr. BEDDOES.

expanded tendon of the psoas parvus*. This fascia is in immediate contact with the muscles; the iliac vessels, and the peritoneum cover its anterior surface, and are connected to it by a loose cellular substance. It is attached on the inside to the line which bounds the superior aperture of the pelvis; on the outside, to the anterior portion of the inner edge of the crista ilii; and below, to the posterior margin of the crural arch†. The latter insertion terminates in a pointed form just over the passage of the vein. Another part of the fascia is continued over the bone, and behind the artery and vein into the thigh, where it forms the posterior portion of the sheath, including those vessels, and is continuous with the fascia lata.

In consequence of the structure just described, the crural arch is firmly confined in its situation, and the protrusion of the abdominal viscera under it is obviated. A small space, however, is left between the iliac vein and the thin border of the tendon, not closed towards the abdominal cavity, and consequently affording an opportunity for the occurrence of herniæ. This, which is either filled with cellular substance or an absorbing

* It is described by Mr. Cooper under the name of *fascia iliaca*.

† Here the fascia consists of two layers, with the arteria and vena circumflexa ilii passing between them.

gland, is called by GIMBERNAT*, the *crural*, and by Mr. HEY† the *femoral* ring. The space in question is bounded above and in front by the crural arch; below and behind by the pubes; on the internal or mesial side by the thin border of the tendon; and on the outer or lateral aspect by the crural vein‡.

The fascia lata, or fascia of the thigh, has two distinct insertions at the upper and anterior part of the limb. It is attached to the front edge of the pubes, over the origin of the pectineus, the fibres of which it closely covers, and it is also fixed to the front of the crural arch. The former of these is continuous, behind the femoral vessels, with the iliac fascia: the latter is not inserted along the whole length of the tendon, its attachment ceasing on the inner side of the vessels, which it covers anteriorly. Here, therefore, the femoral artery and vein are interposed between the two divisions.

Under the anterior portion of the crural arch a large oval depression is found on the front of the thigh, on the surface of the pectineus mus-

* P. 38.

† P. 148.

‡ See the measurements quoted from Mr. COOPER, at p. 165.

cle*. At the upper, outer, and lower sides, this hollow is bounded by a sharp and defined edge of the fascia; but it has no such boundary internally. Where the attachment of the fascia lata to the crural arch terminates, it forms a distinct semilunar, or crescent-shaped fold†. The upper end,

* Bichat, in describing the fascia of the thigh, says, "Elle est percée de divers trous pour le passage des vaisseaux "et nerfs. Le plus remarquable de ces trous est celui qui, "placé sous le ligament de Fallope, au devant du pectiné, "donne passage à la veine saphène." *Anat. Descr.* t. 2, p. 309. It is strange that so remarkable a feature in the anatomy of the fascia should have been entirely overlooked by Soemmerring, both in his account of the fascia, and of the vein. *De Corp. hum. fab.* t. 3, § 281: and t. 5, § 263.

† This part is represented in the first plate of Mr. Cooper's work on inguinal hernia, although it is not marked by any letter of reference. Its upper extremity is designated by the letter k in Mr. Hey's plate, as forming his femoral ligament. *Pract. Obs.* plate IV. But Mr. A. Burns of Glasgow has described it the most minutely, under the name of the *falciform process* of the fascia lata, in "Observations on the Structure of the Parts concerned in Crural Hernia," contained in the 2d vol. of the *Edinburgh Medical and Surgical Journal*, p. 265—274, with two plates. In describing that portion of the fascia lata, which is fixed to the crural arch, Mr. Burns gives the following account of the falciform process. "Just where this "layer ceases to arise from the arch, we find the superficial "vein entering, and therefore this vein is not covered with "the inner or principal layer of the fascia, and, on dissecting "away the vein we see still better the structure of these parts: "we find that the fascia stops just at the entrance of this "vein; and, in many cases, it terminates abruptly with a neat

or horn, of this crescent, is the last portion of the fascia, towards the inside, connected to the crural arch, and it bends under the tendon so as to unite with the thin portion or border at its commencement. The concavity is turned towards the opposite limb, and the inferior horn is situated downwards and outwards on the thigh. This fold covers the femoral artery and vein just under Poupart's ligament, excepting a small portion of the latter at its inner side. The lower horn of the crescent is continuous with a second semi-lunar edge, having its concavity turned upwards, and forming the inferior boundary of the oval space*.

" firm margin, which is traced someway down the thigh. " The edge is lunated, and the concavity is directed towards " the pubes, or superficial vein. This is the usual appearance " of the parts; sometimes, however, the structure is not quite " so distinct, for occasionally a considerable quantity of reti- " cular cellular matter is placed about, and adheres to the " crescentic margin of the fascia. Nevertheless, in every " instance, this lunated edge may be discovered, by passing " the finger from the abdomen through the crural ring, and " pressing outward; and by dissection it may be clearly de- " monstrated in emaciated anasarcous subjects."

* This must be the part described by Mr. BURNS in the following passage: " about an inch and a half below the crest " of the pubes, the pectineal apeneurosis sends off a process " or duplicature to be inserted into the under surface of the " fascia, at a very little distance from the falciform process; " and this duplicature divides the superficial vein and lym-

Here the two divisions of the fascia lata are continuous. The great saphena vein passes over the last-mentioned fold, and opens into the femoral, where that is not covered by the fascia lata. On the inner side the oval depression is not defined by any boundary. The fascia covering the pectineus is continued behind the femoral vessels, and the handle of a scalpel may be passed on its surface in this direction, so as to elevate them. The femoral vein is covered by a dense fibrous substance, which completes its sheath in the part where it receives the saphena.

The femoral artery and vein, surrounded and connected by a compact fibrous substance, are covered in front, immediately under the crural arch, by that part of the fascia lata, which terminates in the semi-lunar edge; and they lie on the production, continued over the pubes from the iliac fascia.

" phatics which enter with it, completely from the large ves-
" sels lying beneath the fascia; and over the edge of this
" process we in general find an oblong conglobate gland folded,
" one half stretching beneath the aponeurosis; the other de-
" scends above it, and thus between the two portions this
" duplicature is interposed. On the outer side of the dupli-
" cature we discover the vena saphena lying in a hollow, or
" channel, which is covered only by the superficial thin layer
" of fascia, and which leads us up to the crural foramen of
" GIMBERNAT, situated between the great vein and the cres-
" centic fold at the pubes; and, in femoral hernia, it is in
" this hollow, which may be called the vagina of the saphenic
" vein, that the gut is lodged."

The latter is united, externally to the vessels, to the sheath, including the sartorius. The covering of the vein, on the inside, or concavity of the semi-lunar edge, has been just mentioned.

Along the whole of the bend of the thigh, a thin and irregular fascia, or condensed cellular texture intervenes between the parts now described and the integuments. This covers the upper part of the fascia lata, the crural arch, and the lower portion of the aponeurosis of the obliquus externus. It contains different layers intermixed with the absorbent glands of the lower extremity, and with the superficial veins which join the trunk of the saphena*.

The crural arch, and the adjacent tendinous expansions, are a complex subject, of which description alone will almost inevitably lead the student to form erroneous notions†. The different parts of this structure must be designated by par-

* This fascia is described by CAMPER, *Icones Hern.* p. 11. Mr. COOPER calls it the superficial fascia.

† These parts should be dissected both from before and behind. In the former case, after removing the integuments, the superficial fascia, with the absorbent glands, and some cutaneous veins are brought into view. When these are dissected away, we see the attachment of the fascia lata to the crural arch; the termination of this portion in the lunated edge, over the femoral vein; its continuity behind the saphena, by a second semi-lunar edge, with the pectineal portion of the fascia; the insertion of the latter into the pubes;

ticular names; and these are supposed to belong to distinct and separate organs. Let the student constantly bear in mind that these are all intimately connected, and that the different names indicate parts of one continuous expansion. The iliac fascia should be regarded as a part of the fascia lata: the thin border of the crural arch, and the semi-lunar portion of the fascia lata are so intimately connected, that no just idea can be formed of them in an insulated state. This general connexion maintains all the parts in a condition of mutual tension, which is materially affected by the position of the thigh, in consequence of the attachment of the femoral aponeurosis to the crural arch. The latter is drawn

and the oval depression in which the saphena is placed at its termination. By detaching the lunated edge of the fascia from the crural arch, the femoral artery and vein will be exposed, and if these are cut across, and turned upwards, the continuation of the fascia lata from the pectineus muscle, behind them, and over the pubes, to constitute the fascia iliaca, is brought into view. When the peritoneum is separated from these parts on the inside, the iliac portion of the femoral fascia (fascia iliaca) is exposed, with the iliac vessels lying on it; its connexion with the crural arch; the broad insertion of the arch into the spine and crista of the pubes; its crescentic edge, and the space between this margin and the iliac vein, called the femoral ring, are also exposed. By dividing either the thin border of the arch, or the semi-lunar edge of the fascia near the arch, the connexion and mutual tension of these parts will be perceived.

downwards by this insertion, so as to describe a convex line towards the thigh. When the limb is extended, rotated outwards, and carried in the direction of abduction, the parts are in the greatest tension. The semi-lunar edge of the fascia, and the posterior border of the crural arch, which, at the point of their junction, form the upper boundary of the crural ring, are then found to press very closely on the finger passed into that ring; and the crural arch itself is drawn downwards as much as possible. By rotating the thigh inwards, bending it, and carrying it across the opposite limb, the parts are brought into the most complete relaxation.

Mr. Hey, whose excellent *Practical Observations* have made a most valuable addition to the records of surgery; and have thrown great light on the particular complaint, which forms the subject of these pages, has described at some length the parts which we are now considering. The general circulation, which this book has most deservedly gained, renders it necessary for me, with all deference to the well-known abilities and experience of this gentleman, to take the liberty of remarking that his representation of the subject is not perfectly clear. He describes the part, which he supposes to form the strangulation in crural hernia, under the name of *femo-*

ral ligament; giving to the rest of the crural arch the epithets of *Poupart's*, the *abdominal*, or *Fallopian ligament*.

There can be no objection to this new term, as descriptive of a particular portion of the crural arch: but when the femoral ligament is said to be connected by an aponeurosis to Poupart's ligament, and to be separated from it occasionally by so wide a space, as to allow the whole contents of a rupture to be contained in the interval*, there must be some inaccuracy in the statement. An examination of the dead subject will convince any person that the abdominal and femoral ligaments of Mr. Hey are only portions of one and the same continuous expansion; which is in fact the inferior margin of the aponeurosis of the external oblique muscle, is commonly known by the name of Poupart's ligament, and has been termed by Gimbernat and some others, the *crural arch*.

Mr. Hey has represented the *femoral ligament* under several points of view, which, if not inconsistent with each other, make it difficult for persons previously unacquainted with the subject to understand his description; and indeed render it rather doubtful what part he means to designate by this name. Thus he states that it "resembles

* *Practical Obs.* p. 157.

the inferior border of the aponeurosis of the external oblique muscle of the abdomen*:" again, that it is " another ligament, somewhat similar to that of Poupart, but smaller†." These expressions, together with the representations of its lying deeper than Poupart's ligament, of the possibility of feeling its sharp edge by thrusting the finger on the inside of the femoral vein from the abdomen, and the directions which are given to divide it by cutting in the deepest and most interior part of the stricture, would lead us to conclude that the author was describing the thin posterior border of the crural arch. But in another place he calls it " a part of the fascia of the thigh‡;" and this description, with the representation in the annexed plate, would rather induce us to suspect that the semi-lunar edge of the fascia lata is the part alluded to. After these few remarks on the subject, I have great pleasure in adding, that the leading points in the anatomy of femoral hernia; viz. the protrusion of the viscera on the inside of the iliac vein; their strangulation by a part of the crural arch, which is felt when the finger is thrust down towards the thigh in this direction; and the important practical fact, that the division of this part is the right way

* *Practical Obs.* p. 154.

† Ibid, p. 151.

‡ Ibid, p. 153.

of relieving the stricture, are correctly stated in Mr. HEY's valuable work*.

* That a gentleman whose professional employments are so extensive as those of Mr. HEY, should find leisure to publish the results of his experience in a work not less valuable for its clear and appropriate style, than for the solid information which it conveys, is much more extraordinary, than that he should have expressed himself not quite so clearly on some anatomical points. Let it be remembered that Mr. HEY, without the advantages of scientific communication and investigation afforded by the metropolis, had developed circumstances in the anatomy of femoral hernia, and adopted a mode of operating in that complaint, which had escaped the notice of those whose opportunities were much more ample. In the second edition of his work, I feel confident that all obscurity will be removed; and for this reason I might have suppressed the above remarks had it not appeared more just towards Mr. H. by re-printing them, to take the opportunity of adding an explanation communicated to me in a letter from that gentleman. It will convince the reader that the *femoral ligament* is just the junction of the semi-lunar edge of the fascia lata, with the thin border of the crural arch; and it will account for the description being applicable in different points to both these parts.

" When I wrote that description, nothing had been pub-
" lished on the anatomy of femoral hernia, except GIMBER-
" NAT's pamphlet. I did not fully understand this at the first
" reading, and incautiously laid it by; determining, however,
" to take such opportunities as might offer of searching for
" the part which caused the stricture in that species of hernia.
" In doing this I resolved to keep the parts, as far as possible,
" in their natural state. I therefore did no more than remove
" the integuments from the fascia lata of the thigh externally,

Section II.

Anatomical Description of the Femoral Rupture.

This rupture takes place through that space named the crural ring, which is situated under

" and take out the fat and small lymphatic glands from the " femoral sheath internally. I then cautiously made my " finger pass down the sheath on the inner side of the femoral " vein, and observed where the stricture was the greatest. " My finger was pushed down till it appeared upon the fascia " of the pectineus muscle. In this course it would be com- " pressed chiefly by the sharp edge of the posterior attach- " ments of Poupart's ligament, and by the lunated edge of the " fascia lata. These two parts would, by the pressure of my " finger, be generally made to coincide, as they are in nature " united. My description includes them both, and considers " them as one. With this key you will find my description " not unintelligible. In one part of your criticism, however, " you have mistaken my meaning, which certainly is not " clearly expressed. In describing an operation performed " in 1784, (p. 157) to shew that I had from experience ob- " tained some knowledge of the part which forms the stricture " in femoral hernia, though my anatomical knowledge of it " was very inaccurate, I say, 'The aponeurosis (forming " Poupart's ligament) consisted of two layers, which were " separated considerably from each other, when I attempted " to reduce the intestine, *it passed* into the cavity formed " between these layers,' &c. I did not mean to say, that the

the crural arch, and between its thin border and the external iliac vein. Protrusion of the viscera, under any other part of the tendon, is prevented by the attachment of the iliac fascia. The situation of the descent has been rightly stated by POTT*; but it is erroneously represented in several works, which are usually considered as of the highest authority. PETIT† and SABATIER‡ speak of the parts descending in some cases over the psoas magnus and iliacus internus. CALLI-

" interval between Poupart's ligament (the anterior border of " the aponeurosis of the external oblique muscle) and the " posterior sharp edge of that ligament, which I called " *femoral ligament*, were occasionally at such a distance from " each other, in their natural state, ' as to allow *the whole* " *contents of a rupture* to be contained in the interval,' as you " express it, p. 222, Lawr. on Hernia. To understand my " meaning it must be observed, that I had divided Poupart's " ligament (its anterior border) and thereby so relaxed the " parts as to permit " some of the sound intestine to slip out " of the abdomen.' Under these circumstances I had in- " creased the distance of the posterior sharp edge, from the " integuments, and could then push up a considerable part " (certainly not the whole) of the rupture into the interval. " This I meant when I said ' *it passed*' into the interval; the " hernia remaining strangulated by the posterior edge, which I " believe with you is generally the true seat of the stricture."

* *Works*, vol. II. p. 152.

† *Traité des Mal. Chirurg.* t. II. p. 249.

‡ *Medécine Operatoire*, tom. I. p. 143.

SEN* states, that the iliac vessels may be found behind, or on either side of the tumour: and even RICHTER†, who says that the parts commonly protrude in the situation above described, mentions that they sometimes come down before, and sometimes on the outside of the iliac vessels. All those who have taken the trouble to investigate carefully the structure of the parts in the natural and diseased condition, represent the fact as I have stated it above: GIMBERNAT, HEY, MONRO, COOPER, and other modern writers, are unanimous on this point. No instance of hernia under the crural arch has been hitherto recorded, except at the crural ring‡.

The viscera descend from the abdomen at first nearly in a perpendicular direction, and come into the hollow in front of the pectineus. Since the motions of the thigh, and the more close adhesion of the integuments to the subjacent

* *Systema Chirurg. hodiern. pars post.* p. 495.

† *Traité des Hernies,* p. 242. RICHERAND, whose system, although very recent, contains none of the late discoveries concerning ruptures, has the same erroneous statement. *Nosographie Chirurg.* t. 3, p. 400.

‡ Some writers have spoken of crural herniæ above the crural arch. In the 3rd Section of Chap. IX. I have noticed a case of this kind, which appears to have been an inguinal hernia that had not passed the lower opening of the canal. Dr. HULL has rightly referred such cases to the inguinal or ventral species. *Med and Phys. Journal,* v. 11, p. 49.

parts resist the increase of the tumour downwards, and the larger quantity of cellular and adipous substance at the bend of the limb offers less resistance, it comes forward to the surface, so as to lie in general in front of the crural arch. For the same reason it extends outwards, or towards the ilium, assuming an oblong shape, with the long axis parallel to the crural arch. In consequence of this structure, the *body* of the sac forms a right angle with the *neck*; and that part of it, which, if it had continued to descend in a straight direction, would have been the lowest part of the bag, or the *fundus*, is actually the anterior portion. Dr. Monro* probably means to describe this peculiar course of the hernia, when he speaks of the swelling being "tilted upwards" on the crural arch.

That portion of the sac, which lying under Poupart's ligament, may be called its neck, is generally about half an inch in length, and is frequently more. When we consider that the strangulation takes place exactly where this contracted portion communicates with the abdominal cavity, and that the parts are covered by a considerable thickness of adipous substance, we shall expect to find the strangulated part at a great distance from the surface.

* *Observations on Crural Hernia*, p. 84.

The viscera descend over the pubes, where the pectineal portion of the fascia lata, after closely covering the muscle, is inserted into the bone; hence the tumour is situated in front of the pectineus, and of the fascia lata. I think it right to be more explicit on this point as surgeons have generally supposed that the femoral rupture is covered by the fascia of the thigh*; and they even go so far as to say, that, in performing the operation we may cut boldly through the integuments on this very account. I suspected the truth of this representation, from having often looked in vain for the fascia in operations; and from observing that the tumour feels loose, and has a circumscribed edge, instead of being tense, and having that obscurely defined margin, which we should expect, if it were covered with the fascia. Dissection has shewn that my suspicion was well grounded. If the

* This opinion will be found in most surgical books: that it is retained, even in very modern works, will be proved by the two following quotations. MONRO states that a crural is less moveable than a scrotal hernia, in consequence of its being immediately covered and bound down by the tendinous aponeurosis of the muscles of the thigh. *On Crural Hernia*, p. 56.

"We know also that the herniary tumour is in truth "under the fascia." *System of Operative Surgery*, v. 1, p. 294.

integuments and cellular substance are carefully removed from a femoral rupture, we shall find that it lies on that portion of the fascia which, covering the pectineus, is inserted into the front edge of the pubes; and that, as it comes over the margin of the bone, to which the fascia is fixed, it must necessarily be placed on the anterior surface of that part.

The variety of crural hernia*, in which the parts are contained within the sheath of the crural vessels, must be excepted from these observations. The swelling in that case is covered by the fascia lata; is consequently more obscure to the feel; and has not a defined edge.

The peritoneal sac of the rupture is covered by an exterior investment, named by Mr. Cooper the *fascia propria*. This is generally thicker than the peritoneum, close and firm in its texture, and embraces the whole of the tumour, to the very neck. More or less adipous substance is interposed between it and the peritoneal covering of the rupture. Since the parts descend on the inner side of the vein, I am disposed to refer the origin of this fascia propria to the condensed fibrous substance, which completes the crural sheath on its inner or mesial side. The superficial covering is often consolidated at some parts

* Cooper, pt 2, p. 20, plate 8, fig. 1.

with the fascia propria; and that again with the peritoneal sac.

Mr. Cooper gives the following account of the fascia propria and its origin. "A thin fascia* "naturally covers the opening, through which "the hernia passes, and descends on the posterior "part of the pubes. When the hernia therefore "enters the sheath, it pushes this fascia before it, "so that the sac may be perfectly drawn from "its inner side, and the fascia which covers it "left distinct. The fascia, which forms the "crural sheath, and in which are placed the "hole or holes for the absorbent vessels, is also "protruded forwards, and is united with the "other, so that the two become thus consolidated into one. If a large hernia is examined "this fascia is only found to proceed upwards, "as far as the edge of the orifice on the inner "side of the crural sheath, by which the hernia "descends; but in a small hernia it passes into "the abdomen as far as the peritoneum, and "forms a pouch, from which the hernial sac "may be withdrawn, leaving this, forming a "complete bag over the hernia†."

* I have not found this on dissection.

† Pt. 2, p. 6 and 7. Some casual notices may be found of the structure of the sac in crural hernia. Morgagni ob-

The upper end of the falciform process passes over the upper and outer part of the neck of the tumour; it is then folded under the crural arch, and continues into the thin posterior border. The iliac vein is placed on its outer side; the pubes is directly behind it; and the upper and inner parts are bounded by the thin posterior edge of Poupart's ligament. It is this part which forms the strangulation, as any person may easily ascertain, by passing his finger into the neck of the sac, or by thrusting it, in the healthy subject, into the corresponding part. The merit of first discovering, and of making public this fact is due to GIMBERNAT.

The semi-lunar portion of the fascia being attached to the crural arch at the point, at which the hernia comes out, contributes in some degree to the strangulation, as we may ascertain by passing the finger in the course of the rupture. Indeed the upper boundary of the crural ring is formed by the continuity of the falciform process with the thin border of the crural arch: and, as this is the seat of the stricture, both these parts

served, in dissecting such a case, "that the hernial sacculus "was thick, and easily divisible into many laminæ of coats." Lett. 34, art. 15. MAUCHART also noticed the fact "Saccus "herniosus etiam in hernia crurali duplex est," &c. See HALLER, *Disp. Chir.* t. 3, p. 152. But it was not generally understood until the publication of Mr. COOPER's work.

are concerned in forming it. Hence the stricture is relieved by relaxing this process. It is not, however, so essentially concerned in producing the incarceration, as the thin posterior border of Poupart's ligament.

In the second part of his observations on hernia, Mr. Cooper has entered very minutely into the description of the anatomy of the crural arch, both in its natural and diseased state. According to this gentleman's representation, the viscera contained in a crural rupture are protruded in the first instance into the sheath surrounding the femoral vessels; from which they escape through the openings, formed for the passage of the lymphatics of the lower extremity. Hence it follows that the most frequent seat of strangulation is in the border of this opening. My own examinations of the subject have led me to refer the cause of stricture to the thin posterior border of the crural arch, at the part where it is connected to the falciform process, and I have hitherto found no reason to change my opinion on that subject. The difference does not appear an important one; nor can it influence the mode of operating.

The epigastric artery passes obliquely upwards and inwards on the outside of the hernial sac; and is situated at the distance of half an inch

from the neck of that part. The obturator artery is frequently produced by the epigastric, in which case it may either go on the outer side of the sac to the obturator foramen, or it may pursue its course along the inner magin. In the latter distribution the neck of the sac would be surrounded by a large vessel in three fourths of its circumference. The iliac vein is on the outside; the common trunk of the epigastric and the obturator vessels would lie on the front, and the obturator artery itself would be found on the inner margin of the sac.

The spermatic chord and the round ligament of the uterus pass directly over the superior part of the swelling; and are not more than half an inch distant from the mouth of the sac.

CHAP. XV.

SYMPTOMS AND DIAGNOSIS OF THE FEMORAL RUPTURE.

FEMORAL ruptures are by much the most frequent in women; they may indeed be regarded as the peculiar herniæ of the female, as the inguinal are of the male sex. Mr. HEY* never met with any kind of strangulated hernia in females but this. The greater breadth of the female pelvis, and the broader insertion of the crural arch in the male are the assigned causes of this difference. It may be combined with an inguinal hernia on the same side; but this is not common.

It is attended with an indolent swelling at the inner part of the bend of the thigh, and the general symptoms, which denote a protrusion of the abdominal viscera. The space through

* *Practical Obs.* p. 154. It is also much more frequent in married women than in girls; ARNAUD states, that nineteen out of twenty married women, afflicted with hernia, have this species of the complaint; while in men, and unmarried females not one in a hundred has it. P. 133.

which it descends is very small, and does not admit of much enlargement in any direction. Hence the swelling is generally small, and sometimes remarkably so*. The opening is very seldom increased to any great magnitude, as that of the abdominal ring is in large and old scrotal herniæ. Exceptions to this observation, although very rare, do occasionally happen.

CASE.

A middle-aged woman was admitted into St. Bartholomew's Hospital with a femoral rupture of eight years standing. It had generally admitted of partial reduction, and once, during a state of pregnancy, had entirely receded. Although the size of the swelling had been always very considerable, it had never occasioned any inconvenience, except from its bulk, until the time of her admission, when it measured nineteen inches across in the perpendicular direction, and twenty-seven inches in circumference. The integuments at this time had a red appearance, and the patient was in a state of considerable general

* Dr. HULL states that the tumour varies ordinarily from the bulk of a hazel nut to that of a walnut. *Med. and Phys. Journ.* v. 11, p. 54. SABATIER particularly notices the smallness of the swelling; *Med. Op.* t. 1, p. 144 and seq.

weakness; the strength gradually declined; the integuments ulcerated and burst, so as to expose the intestines partially; and about a gallon of serous fluid escaped from the opening. There was a constant discharge of the same fluid until the time of her death. Dissection shewed that the protrusion had taken place in the usual situation under the crural arch, and that the sac contained the whole of the jejunum, ilium, cæcum, and ascending colon, with a large share of the omentum.

Mr. HEY* mentions a similar instance to that which I have now related; and Mr. THOMSON†, the learned professor of military surgery in Edinburgh, has witnessed a case of the same description. In both the last-mentioned patients the integuments had become so thin in consequence of the increase of the tumour, that the peristaltic motion of the bowels could be distinguished.

Intestine is the part most frequently contained in crural herniæ: omentum alone is seldom seen in them. When the swelling is small it may easily be mistaken for an inguinal gland, particularly if it contain omentum‡. The circumstances,

* *Practical Observations*, p. 230.

† COOPER, pt. 2, p. 6. Dr. HULL in one instance saw a femoral hernia as large as a child's head in a man.

‡ SABATIER acknowledges that he has mistaken femoral

which attended the origin and progress of the tumour, together with its present state and symptoms, generally enable the surgeon to decide upon the nature of the complaint; although the sensible characters of the swelling should be insufficient to lead to this discrimination. If it appeared suddenly after a violent effort; if it increase in consequence of exertion, and diminish or disappear on pressure, or in the recumbent posture; if an impulse be felt when the patient coughs; and intestinal affections have been caused by it, the case must be a hernia. An enlarged gland is generally harder than an unincarcerated hernia; it swells imperceptibly and gradually; is invariable in its size; and causes no disturbance of the alimentary canal. The existence of symptoms, which usually attend a strangulated hernia, will remove any doubt that the surgeon might entertain on the subject; and, if these symptoms do not yield to the usual remedies, will authorize him in operating, although the examination of the tumour should not satisfy his mind that the swelling is a hernia. No great inconvenience can arise from cutting down upon an enlarged gland; while the patient's life would be endangered by putting off the operation in a case

hernia for an enlarged gland; and vice versa. *Med. Operat.* t. 1, p. 144 and 147.

of rupture. These considerations would undoubtedly have justified Mr. Else in opening the tumour in the fatal case of crural hernia, which he has recorded in the fourth volume of the Medical Observations and Inquiries; for the want of fecal evacuations clearly pointed out the nature of the affection.

I have seen a hospital surgeon, a man of considerable practice and eminence in his profession, mistake a femoral hernia for a glandular enlargement, although the attendant symptoms sufficiently indicated the nature of the complaint. So strongly did the tumour in all its sensible characters resemble a swoln gland, that the operation was not performed, although the marks of strangulation were present; and the patient's death afforded an opportunity of ascertaining that the complaint had been caused by a protrusion of the bowel. Mr. Cooper informs us, that a surgeon in considerable practice sent into Guy's Hospital a man with a crural hernia, which had been poulticed for three days on the supposition of its being a venereal bubo: and when the operation was performed the intestine was found mortified. In another case the swelling was opened, under a similar mistake; the stools were discharged at the opening, and the patient soon after died*. Similar fatal errors are recorded by

* Pt. II. p. 8.

Petit*. The importance of this subject and the inevitably fatal consequences of a mistake, induce me to repeat, what I have already observed, that the existence of symptoms justifies us in operating where the characters of the tumour are doubtful. I will venture to add, that, if in compliance with this maxim, the surgeon should, under any unusual concurrence of circumstances, cut down on a merely glandular swelling, he will be acquitted in the opinion of every judicious practitioner; and his conduct will not be attended with any injurious consequence to the patient: if, on the contrary, he persists in preferring the testimony of his touch to the dictates of his reason and judgment, and refuses to operate, where the symptoms demand the use of the knife, he must be considered as responsible for the death of the patient.

A femoral rupture has often been mistaken for a bubonocele; and the error is not an improbable one, in consequence of the swelling lying, as it frequently does, on the crural arch. The surgeon may consider this mistake as an innocent one, since it does not involve the nature of the complaint, nor the general measures required for its relief. He must change his opinion when he finds that the pressure in the attempts at reduc-

* *Tr. des Mal. Chir.* tom. II. p. 293, et seq.

tion ought to be exerted in a very different direction; and that the close connexion of various important parts with the crural hernia, would expose him to the risk of some dangerous or even fatal mistake in performing the operation, under such an erroneous idea as to the situation of the rupture. The relation which the neck of the tumour bears to the crural arch, and to the spine of the pubes, will enable the practitioner to distinguish the two cases. If the swelling of a crural hernia be drawn downwards, it will be found that the crural arch can be traced passing over the neck of the sac; while in bubonocele it is found under that part. The spine of the pubes, which is behind and below the neck of the sac in an inguinal hernia, is on the same horizontal level, and rather within it in the crural species*.

* Richter has seen this mistake often committed, even by persons of experience—*Tr. des Hernies*, p. 243; and Mr. Cooper has witnessed similar blunders.

The facility with which this mistake may be committed is probably the reason why the existence of crural hernia, as a distinct species, was so long overlooked. *Verheyen*, who published his *Anatomia Corporis Humani* in 1693, is generally considered to have been the first who noticed it. I subjoin the passage, as it contains an instance, in which the rupture caused no external swelling. "Alius huic vicinus locus est, "ubi fiunt herniæ periculosæ et sæpe lethales; scilicet' ubi "venæ et arteriæ iliacæ tendunt ad crura." After mentioning

The swelling formed under the crural arch in the case of psoas abscess may be mistaken for a crural rupture. It is an indolent tumour, which may be made to disappear, at least partially, on pressure, and in which coughing or holding the breath gives the feeling of an impulse. As the contents of the swelling are fluid, fluctuation may generally be perceived, and the swelling does not retire, as in the recumbent posture. As this kind of local affection is subsequent to the formation of an abscess in the neighbourhood of the psoas muscle, the preceding pain in the loins attended perhaps with shivering and other symptoms, and the absence of those intestinal affections attendant on herniæ enable us to distinguish the nature of the complaint. If the surgeon should form a wrong judgment in such a case, it cannot cause any serious consequences; the progress of the abscess will speedily set him right.

A varicous state of the femoral vein may be

a fatal case, he adds "Eundem casum invenio quoque observatum a Cl. D. Nuck; et, quod mireris, in utroque casu nihil exterius fuit observatum, quod referret herniæ speciem, nequæ ægri de aliqua in eo loco molestia fuerant conquesti, adeo exigua apparet causa istius mali." Tract: 2, cap. 7. Le Quin, however, seems to have known the femoral hernia before this time. See his *tractatus de herniis* in the *Chirurgia Barbettiana*, in the works of Barbette, by Manget, pp. 54, 55, and 74.

the more readily mistaken for a rupture as it admits of being reduced by pressure, increases by coughing, exertion, and the erect position, and is not perceived in the recumbent posture. In a case of this kind related by Mr. Cooper*, where the swelling disappeared on lying down, pressure on the vein above the crural arch made it appear again. Petit† has recorded an instance, which I insert here as these cases are rare.

CASE.

" Being at Courtray, in Flanders, I was " informed by my hostess that her maid-servant " had in the groin a tumour about the size of a " hen's egg. It produced no inconvenience " while she continued at rest, and disappeared " spontaneously in bed: it came down again " when she rose, and gradually increased to its " ordinary volume. A sense of heaviness and " pain was then perceived in the thigh, leg, and " foot; and obliged her to take occasional rest. " An itinerant charlatan, conceiving the tumour " to be a hernia, supplied the patient with a bad

* Pt. 2, p. 9.

† *Tr. des Mal. Chir.* t. 2. p. 299.

" truss, at a very dear rate. This occasioned " such pain in the thigh and leg, that it could " not be worn for an hour at one time. The " Doctor advised her to wear it only in the " night; when its application was not attended " with pain. I found this young woman in a " state of great suffering, although the truss had " been laid aside for two days. The colour of " the tumour was rather brown; it could be " returned with facility, and the skin then re- " sumed its ordinary appearance; which con- " vinced me that the peculiarity of colour arose " from the contents. On continuing the exami- " nation, a swelling of the same colour appeared " along the thigh, and a kind of cord could be " felt by tracing the course of the saphena. " Several large varices were found at the knee; " and others, in greater number and size, about " the malleolus internus. I was now fully per- " suaded, that the supposed rupture in the groin " was a dilated state of the saphena, which, as " we know, empties itself into the crural vein " near the passage of the latter under the arch " of the abdominal muscles, and in the situation " of crural herniæ."

Tumours composed of watery cysts*, and

* *Parisian Journal*, t. 1, p. 252. MONRO *on crural hernia*, p. 80.

others of a more solid kind have been observed about the situation of the crural arch. The history and symptoms would probably point out the nature of the case; and, even if such a tumour were mistaken for a rupture, the error could hardly give rise to any practical ill consequence.

CHAP. XVI.

TREATMENT OF THE FEMORAL RUPTURE.

Reducible Femoral Hernia.

A Reducible femoral rupture may be retained by a truss of nearly the same shape with that which is employed in bubonocele. The distance from the curve to the end of the pad should be rather less, on account of the different relative position of the aperture. Since the instrument rests in the bend of the thigh, where it must interfere with the motions of the limb, the pad should be as narrow, from above downwards, as is consistent with the objects of the application; and it should be continued nearly in the same straight line with the spring, instead of being turned downwards. The crural ring, from its structure and situation, is less affected by external pressure than the abdominal canal. An advantage will be derived from bending the under edge of the pad backwards; so that its convexity, instead of being

placed vertically, shall be turned a little upwards.

Crural herniæ are radically cured by means of trusses, less frequently than those of the inguinal kind. The sides of the aperture appear from their structure to be less capable of contraction, and they are certainly less susceptible of approximation from external pressure.

Strangulated Femoral Hernia.

The smallness of the opening, through which the parts descend, and of the tumour itself, have been noticed already. In consequence of the former circumstance, the incarcerated femoral rupture is distinguished beyond all others by the closeness of the stricture. In all the instances, where I have seen the operation, there has never been room to pass more than the tip of the operator's finger under the stricture; and frequently even this has been impracticable. I have constantly found the same state of parts in the dead subject, except in the remarkable case related above. In one instance, where the sac actually contained both intestine and omentum, I could not, after removing the protruded parts, force my fore-finger into the opening; and in another,

where a complete fold of intestine had been engaged, the opening, after removing the gut, would not admit a full-sized bougie, without considerable pressure. These circumstances will lead us to expect, as we actually find to be the case, that the femoral hernia easily becomes strangulated; that the closeness of the stricture diminishes the chance of reduction by any means but the operation; and that the great pressure, which the parts experience, must render delay very dangerous.

I think it right to insist more particularly on these points, because Mr. Pott has represented them in a directly opposite light. He states that the femoral rupture seldom becomes strangulated; that the contents may generally be returned in the operation without any incision of the stricture, on account of the "large space between "the os ilion and os pubis, and that that space "is occupied principally by cellular membrane "and fat*." The anatomical incorrectness of this representation will be detected by the most inexperienced student. I am authorized in stating that the surgical inferences are equally false by having seen the operation performed in twelve instances, and having had several opportunities

* *Works*, vol. II. p. 138.

of examining this hernia in the dead subject. It may, however, seem presumptuous in me to contradict a writer, whose vast experience and sound judgment give such a weight to his opinions, on a point, which must be determined by an appeal to facts. For this reason I shall quote the words of Mr. HEY, who has already noticed the incorrect representation given by the writer above-mentioned, that my own opinion may receive the support of his experience.—" These " declarations surprize me exceedingly, coming " from the pen of an author, who wrote so " much from his own experience, as I conceive " Mr. POTT to have done. If we look at the " skeleton, we shall undoubtedly see a consider- " able space between the os ilium and pubis; " but if we take our ideas from a subject labour- " ing under a strangulated femoral hernia, we " shall rather wonder, from the smallness of the " aperture, how a descent could have happened. " I have now performed the operation for the " femoral hernia fourteen times in the female, " and twice in the male subject, and have always " found great difficulty in introducing the small- " est portion of my fore-finger into the femoral " ring, for the purpose of conducting the bubo- " nocele knife. Nay, this introduction I have " twice found impracticable, and have been

" under the necessity of making use of a direc-
" tor. In no case, in which I have operated, did
" there appear the least probability of reducing
" the prolapsed parts, without previously en-
" larging the aperture*."

I am happy to find that the opinion of Mr. Cooper, as expressed in the second part of his most valuable work on hernia, coincides so completely with my own experience on this very important point. This gentleman notices the comparative smallness of the crural rupture; and states that he has found the means of reduction less frequently effectual in this, than in the inguinal hernia, which he ascribes to two causes, viz. the unyielding nature of the parts, through which the hernia descends, and the smallness of the aperture, forming the mouth of the sac†. He adds that " the delay of the operation, which
" he lamented and condemned, when speaking of
" inguinal hernia, is to be still more deprecated
" in the crural; for death very generally hap-
" pens earlier in the latter disease than in the
" former." The relation of a case follows, in which death took place in twenty-one hours and a half from the accession of the symptoms. In

* *Practical Obs.* p. 150.

† Pt. II. p. 15.

two others, at the end of forty hours the parts were so much altered that it was not thought proper to return them into the abdomen. After mentioning some other instances of the fatal effects of delay, Mr. Cooper concludes by giving his opinion in the following terms: "So strongly "am I impressed with this belief, that if I were "myself the subject of crural hernia, I should "only try the effect of tobacco clysters, and if "they did not succeed, would have the operation "performed in twelve hours from the accession "of the symptoms*." The pressure of the opening on the neck of the sac occasions a thickening and induration of this part; which is more frequent here than in the inguinal hernia, in consequence of the narrowness of the opening.

In our attempts to reduce a crural hernia by means of the hand, the pressure must be accommodated to the peculiar course in which the parts descend. The general observations, which have been already made, concerning the position of the patient, &c. will apply here. As the crural arch, and the fascia of the thigh are so immediately concerned with this swelling, the precautions of bending the hip, turning the limb inwards, and carrying the knee over the opposite

* Page 32.

thigh, are particularly necessary in order to relax these parts. The pressure must first be exerted downwards and backwards, to push the swelling off the surface of Poupart's ligament; and if the parts recede under the application of the force in this direction, it should be continued upwards, in order to make them pass under the crural arch. It must be very obvious, from the description of the course in which the rupture descends, that no advantage whatever can be obtained by pushing the swelling upwards in the first instance. Let the practitioner remember that the smallness of the mouth of the sac, and the consequent tightness of the stricture diminish the chance of effecting a replacement of the rupture by means of the taxis; and consequently, that when the incarceration is completely formed, he should not waste much time in attempts of this description.

The Operation.

The operation for the femoral hernia will be performed in the same manner as that for the bubonocele. The division of the integuments, beginning an inch above the crural ring, should run obliquely downwards and outwards. I pre-

fer an incision in this direction to one, which would cross the middle of the tumour in compliance with the general practice; because it runs over that part of the ligament, which I propose to divide, in order to set at liberty the strangulated parts; and thus we gain more room for executing a part of the operation which is rendered peculiarly difficult by the great depth at which the stricture is situated.

With the same object of gaining room, Mr. Cooper* advises that two incisions should be made in the integuments, resembling the letter T reversed, and having their point of union in the middle of the tumour. The first of these passes perpendicularly over the upper half of the swelling, and is crossed at right angles by the second, which extends in a transverse direction. The angular flaps of the integuments, made by these incisions, are then to be dissected off on each side.

The structure and arrangement of the coverings, which invest the peritoneal sac, must be borne in mind by the surgeon in executing the second part of his operation, that of laying bare the hernial contents. I have many times seen considerable embarrassment arise from an igno-

* Pt. II. p. 15.

rance of this structure, in consequence of which the division of the fascia has led the operator to suppose that he had penetrated the true sac, and exposed the intestine, while it was still covered by peritoneum. But the merely temporary confusion is not the worst consequence of such a mistake: it has been attended in one instance with a fatal termination. After cutting through the first and most superficial investment, a surgeon returned the hernial sac with its fascia propria unopened, into the abdomen. As a free dissection was required, in order to separate it sufficiently for this purpose, the surrounding parts were left in such a manner, as, in conjunction with the neck of the sac, to continue the strangulation, and consequently to cause the patient's death*.

* Cooper, Pt. II. pl. vii. fig. 4. A case, somewhat similar to this, came under my own observation. The operation for crural hernia was performed unsuccessfully on a man. When the abdomen was laid open, the peritoneum at the crural arch appeared distended by a considerable tumour placed between it and the abdominal muscles. The omentum was continued into a round opening with smooth sides at the centre of the swelling. The latter part was composed of a large mass of omentum, adhering partially to the hernial sac, and placed between the abdominal muscles and peritoneum. The cellular connexions between these had been destroyed so as to admit of the membrane being separated to a considerable extent. The hernial sac had been laid open, but its neck was

Particular caution is required in opening the sac, as this hernia never contains more than a very small quantity of fluid; and as the protruded part is very frequently a portion of intestine unaccompanied by omentum.

The direction of the incision for the removal of the stricture is a very material point of consideration, from the important parts, which so closely surround the neck of the sac. If the knife be directed upwards and outwards, the epigastric artery is greatly endangered. If we cut straight upwards, the spermatic chord is exposed to risk*. The latter source of danger does not, however, exist in female subjects, on whom the operation is performed in the great majority of instances. An incision of the most interior part of the stricture is free from all dan-

not divided; and this constituted the round opening I have described in the middle of the tumour. When the narrowness of the stricture in crural hernia is considered, it seems difficult to understand how so considerable a bulk of parts could be returned: but further examination removed this difficulty. The crural arch had been completely detached from the pubes, so that the incision extended from the crural into the lower abdominal ring. Fortunately the spermatic chord was not injured. The parts were removed, and are now in my possession, so that the narrative admits of complete authentication.

* Arnaud divided the spermatic artery in a case of crural hernia; and a fatal hemorrhage into the abdomen ensued. *Mem. de Chir.* 2, p. 755.

ger in the ordinary course of the vessels. But that variety, in which the obturator artery, arising from the epigastric, runs along the inner margin of the sac, seems to preclude us from cutting even in this direction. A mode of operating has been lately proposed with the view of avoiding this danger. We are directed to make an incision through the aponeurosis of the external oblique muscle, just above the crural arch, and in a direction parallel to that part: to introduce a director under the stricture from this opening, and to divide the tendon to the requisite extent by means of a curved knife passed along the groove*.

If this plan were perfectly executed, it would undoubtedly remove all risk of injuring any of those parts, which are more or less endangered in the other ways of relieving the stricture. But it supposes a too perfect and familiar acquaintance with the anatomy of the parts, to admit of being

* *Edinburgh Medical and Surgical Journal*, vol. II. p. 205. "The operation has been performed successfully in this "way, in two cases, in the Royal Infirmary, by Mr. LAW." It seems that this mode of operating was first proposed by Mr. ELSE of St. Thomas's Hospital.—COOPER, pt. II. p. 17. Dr. HULL attempted it, but he could not succeed in passing a director under the stricture from above. Case of Ellen Livesey in *Med. and Phys. Jour.* v. 11, p. 120. Mr. BORRETT found great difficulty in accomplishing it. COOPER, pt. II. p. 18.

practised by surgeons in general. The attachment of the fascia transversalis to the crural arch, and the close connexion of the hernial sac to the tendon in an old rupture must produce considerable difficulty. If the arteries run so near the crural arch as to be endangered by the other way of operating, there will be great risk of wounding them in this method; particularly if the parts should be obscured by bleeding. Lastly, the contents of the swelling would be inevitably exposed to danger, as the extreme closeness of the stricture does not admit of interposing any thing to guard them.

I consider the best and safest method of executing this part of the operation, to be that of dividing the thin posterior border of the crural arch, in the part first recommended by GIMBERNAT; that is, as nearly as we can to its insertion in the pubes. This is the very part which constitutes the stricture, and where a smaller division will accomplish our object, than in any other situation. Yet half an inch in all cases, and in many instances a longer space may be gained in this quarter, without affecting the main insertion of the ligament into the spine of the bone. The crural arch therefore is less weakened by a division of this, than of any other part.

Strong testimony in support of these points may be derived from the advice of RICHTER,

who recommends an incision in the same portion of the arch, without knowing the anatomical reason, on which its propriety is grounded. The following passage shews his opinion on this subject; " Je conseille en même temps de faire " l'incision le plus prés possible de l'angle " interne de l'arcade, non seulement parce qu'on " est plus eloigné de l'artère épigastrique; mais " parceque la hernie passe principalement par " cet endroit, et *qu'on obtient beaucoup plus d'* " *espace lorsqu'on élargit cet angle**."

Mr. HEY has very candidly stated that he had, from experience, gained a knowledge of the proper manner of performing the operation, before he had acquired from anatomical investigations, a just idea of the part, which principally causes the strangulation. He adds, that he had often wondered that so small a division of *the most interior part of the stricture* should be sufficient for reduction.

It will generally be practicable to introduce the tip of the finger or of the nail under the edge of the tendon; the fibres of which should be carefully divided in succession, with the probe-pointed knife, until we have gained just sufficient room to replace the contents of the swelling*.

* *Tr. des Hernies*, p. 249. Or in his *Anfangsgründe der Wundarzneykunst*, vol. V. p. 449.

* The way in which GIMBERNAT executes this part of the

When the tightness of the stricture prevents the operator from using his finger as a guide, he will employ the grooved director, introducing it as near as he can to the pubes. In both cases the blunt end only of the curved knife should be passed beyond the stricture, that the division may be effected without risk to the arteries, in case they should not follow their usual course. The intestine should be protected by the operator's left fore-finger while he is using the right hand in cutting the tendon; and if both his hands are employed, it may be held aside by an assistant; for the depth at which the stricture is situated from the surface, and the narrowness of the opening occasion some danger of injury to this part.

This mode of operating will entirely avoid the spermatic chord, and the epigastric artery in the ordinary course of the vessel. It must be allowed, that in the less frequent distribution, which has been described above, the obturator artery will be endangered. The risk is not sufficient to induce us to exchange this for any other method, that has been hitherto proposed; as I

operation has always appeared to me to be very aukward and objectionable. He employs a director and curved knife, holding each of these in one hand, and then moves them both together along the surface of the bone. P. 45 and 46.

know of none, which avoids the vessel more certainly, while in facility of execution, and in other advantages, this has the undoubted preference.

A calculation of the proportionate number of instances, in which we may expect to find the obturator artery running along the inner side of the neck of the sac, will much diminish our apprehensions concerning the danger of this vessel. Dr. Monro has found the obturator artery to arise from the trunk of the epigastric once in twenty-five or thirty subjects; I should think this unusual origin must occur as often as once in ten instances; yet, where the source of the vessel thus deviates from the accustomed description, it generally takes its course along the outside of the hernial sac, and consequently is exposed to no danger*. The comparative number of instances, in which it is found on the opposite side, cannot be stated higher than one in eight or ten. It would therefore be endangered only once in eighty or one hundred operations. And, if we consider, that by the caution of introducing the knife to the very smallest distance within the stricture, that is

* "In all cases (says Mr. Cooper) which I have myself "dissected, where this variety existed with crural hernia, the "obturator has passed into the pelvis on the outer side of the "neck of the sac, entirely out of the reach of any danger of "the knife."—Pt. II. p. 21.

compatible with effecting the cut, by the careful successive division of the tendinous fasciculi, and by carrying this division only just so far as to gain the necessary room for reduction, the artery may frequently escape; the probability of any unpleasant occurrence is so much diminished, that it hardly constitutes an objection, and certainly would not justify us in leaving this method for any but one that should be perfectly free from all danger.

All the evidence that I have been able to collect on this subject, concurs in demonstrating the safety of the above-mentioned mode of operating. My own practice has furnished me with one opportunity only of trying its merits; and that was perfectly successful.

CASE.

—— Joins, a poor woman of the parish of Ampney, near Cirencester, about fifty years of age, had laboured under a strangulated femoral hernia for six* days, in which time all the usual

* The reader may think that this case does not accord with the representations I have already given concerning the urgent nature of the symptoms, and the rapid progress of crural herniæ. The circumstances sufficiently account for this deviation from the usual course. It must be remembered

remedies had been unsuccessfully employed. On performing the operation, a piece of omentum and a small bit of intestine were found to have passed under Poupart's ligament. Both these parts were of a deep red, and almost brown colour. I removed the omentum; and the divided edge did not afford the slightest hemorrhage. The stricture, which was very deeply seated, was manifestly formed by the thin posterior border of the crural arch. I divided it, in the situation which I have recommended above, by conveying the probe-pointed bistoury in the groove of a director. The parts were now returned with ease, and the patient soon recovered.

Four cases, in which I have seen the operation performed by others, were attended with the same fortunate result. GIMBERNAT has operated in this way in four* instances: and Mr. HEY† employed a nearly similar method with advantage in a much greater number of cases. Mr. COOPER's mode of operating, which must stand on

that the intestine was protected from pressure by a mass of omentum; and the age of the patient must also be taken into the account.

In an instance, recorded by Mr. COOPER, the operation was successfully performed on the eighth day: there also a large portion of omentum was protruded with the gut.—Pt. II. p. 24.

* P. 28 and 29.

† P. 150, et seq.

exactly the same ground with that which I have recommended, as to the danger of wounding arteries, &c. has never been attended with any unpleasant consequence in the numerous instances in which he has practised it.

Gimbernat's operation has been objected to by Mr. Cooper, who recommends a different method of removing the stricture. On account of the depth, at which the posterior margin of the crural arch is situated, and the closeness with which the protruded viscera are embraced by the tendon, he states that the intestine is greatly endangered: that it may easily get before the edge of the knife; or, if it be held aside sufficiently, it is exposed to the danger of laceration. He relates two cases, in which accidents of this kind have actually occurred, and caused a fatal termination. He is therefore in the habit of dividing the stricture on its anterior part, as far as the front margin of the crural arch, directing the edge of the knife upwards and inwards. If this is not sufficient, he afterwards divides the thin posterior border of the tendon, still carrying the knife in the same course. In the male subject he makes a small transverse incision above Poupart's ligament, and draws the spermatic chord out of the reach of the knife by means of a bent probe.

The want of a sufficient number of oppor-

tunities of trying both operations prevents me from forming a decisive opinion on the comparative merits of this proposal, and that which I have already recommended. The thin edge of the crural arch has always appeared to me to be so materially concerned in forming the stricture; and it is so clear, that a division of this part affords much more room than that of any other, that I consider GIMBERNAT's method as meriting the preference. A wound of the intestine can only be ascribed to the want of sufficient care on the part of the operator*.

* It must be acknowledged that the tightness of the stricture, and its depth from the surface are serious difficulties in performing this operation. If, therefore, sufficient room could be gained by dividing the parts between the mouth of the sac and the crural arch, on the anterior part of the rupture, in the way recommended by Mr. COOPER, that method would be preferable. And, when we consider that the falciform process is folded in at this part, and connected to the thin border of the arch, there can be no doubt that the stricture would be relieved to a certain degree. I would therefore advise this plan, with a caution not to extend the cut through the arch; and if sufficient room were not gained, the process recommended above may be followed. As my opinion on this subject is not derived from practice, I did not think proper to alter the view, which I had given in the first edition of this work.

CHAP. XVII.

ON UMBILICAL RUPTURES.

THE terms *exomphalos, omphalocele,* or *umbilical hernia,* are applied to that species of rupture, in which the abdominal contents are protruded through the opening in the linea alba, which transmits the umbilical vessels of the fetus, or in the immediate vicinity of that part. Whether the protrusion take place most frequently in the former or in the latter of these two situations, is a question, the determination of which can be of no practical consequence, although it might perhaps influence the name of the complaint. The term exomphalos can certainly be applied with propriety to that rupture only which occurs at the umbilicus; while any displacement of the viscera through the linea alba in the neighbourhood of the navel should be classed with ventral herniæ.

It was observed by PETIT*, that, in the adult,

* *Traité des Mal. Chirurg.* tom. II. p. 250.

the parts are most frequently protruded at one side of the umbilicus: but Mr. Cooper* is of opinion that they usually take their course through that opening itself. It seems probable that there may be a difference in this respect according to the period of life at which the complaint occurs. The umbilicus, which is a kind of cicatrix, formed after the separation of the funis, by the contraction of the parts to which that chord was connected, arrives by a slow and gradual progress at the degree of firmness and solidity, which it possesses in the adult. Remaining for a long time weaker than the rest of the abdominal parietes, it offers but a feeble obstacle to the protrusion of the viscera: the resistance however increases with time; the navel becomes stronger than the surrounding parts, and prevents more effectually the escape of the bowels.

These anatomical facts will furnish us with two pathological inferences, the truth of which is supported by experience. First; that infancy is more subject than any other age to umbilical herniæ, properly so called, where the viscera are protruded through the navel itself. Secondly; that adults are more exposed to that species of

* *On Crural and Umbilical Hernia*, p. 35.

the complaint, in which the hernia takes place in the vicinity of the umbilicus.

The navel consists in the adult of a round tendinous ring, formed about the middle of the linea alba. The umbilical vessels of the fetus penetrate this opening, and proceed afterwards over the surface of the peritoneum, which lies entire and unperforated behind the aperture. A dense and compact cellular substance occupies the vacancy in the linea alba of the adult; being closely adherent to the peritoneum, and to the remains of the umbilical vessels posteriorly, and most firmly attached in front to an inflected and cicatrized portion of the common integuments.

The protruded parts will naturally tend downwards; so that the opening into the abdomen is from the upper part, and not from the middle of the swelling. As the rupture grows larger, this observation becomes more and more applicable. If neglected, it increases very considerably, descending to the pubes, and even over the pudenda, incapacitating the patient for active exertion, and forming a constant source of intestinal affection. When the subject is fat, the rupture may extend between the integuments and muscles, without causing any external swelling.

The opinions of different surgical writers concerning the sac of the umbilical hernia are

much at variance with each other. Many foreign surgeons have denied the existence of a hernial sac in the exomphalos. The names of DIONIS*, GARENGEOT†, and J. L. PETIT‡, may be cited in exemplification of this remark. They state, that, as the peritoneum has cicatrized at the navel, it must be burst by the protrusion of the viscera. SHARP || has met with a sac in the exomphalos, but seems to think that it is often wanting. The subject has been rightly represented by that excellent surgeon Mr. POTT§. "Whatever," says this celebrated writer, "are the contents, they "are originally contained in the sac formed by "the protrusion of the peritoneum." He then adds, that this sac is very visible in recent and small ruptures, but that it cannot always be distinguished towards the navel in old and large ones. RICHTER¶ is undetermined on the point

* *Cours d'Operations, par* DELAFAYE, p. 106.

† *Mémoires de l'Acad. de Chirurg.* tom. I. p. 702.

‡ *Traité des Mal. Chir.* tom. II.

|| *Critical Inquiry*, p. 50.

§ *Works*, vol. II. p. 165. Other writers have also described the existence of a hernial sac in exomphalos. See MORGAGNI *Epist.* 34, art. 11. HALLER, *Opusc. Pathol.* Obs. 29 et seq. SANDIFORT Obs. *Anat. Pathol.* lib. 1, p. 74. VERDUC *Pathol. de Chirurg.* t. 2, p. 482.

¶ *Traité des Hernies*, ch. 35.

in question. He thinks it difficult to explain why the protruded viscera should not have the usual covering in this species of rupture; and he quotes SCHMUCKER and SANDIFORT as having observed a sac in cases of exomphalos. Yet he gives up his own opinion to the weight of authority, and concludes that an umbilical rupture, occurring in the adult, is not covered by peritoneum.

The erroneous notion, that the viscera are not included in a hernial sac, in the case of exomphalos, has arisen from a mistaken supposition that the umbilical vessels perforate the peritoneum at the part where they enter the body of the fetus. This error could never have been entertained by a person acquainted with the true structure of the parts, since he must have known that the peritoneum is just as entire here as in any other situation of the abdominal parietes. It does indeed often happen, in consequence of that membrane being closely connected to the inflected cicatrix of the integuments, that the distinction between the skin and hernial sac cannot be traced on the front of the tumour; but it is even then most easily discerned in every other part of the circumference. In other cases a hernial sac can be demonstrated over the whole exomphalos just as clearly as in any other species of rupture.

The umbilical hernia is not only furnished with a true peritoneal sac, but it possesses likewise a more superficial investment, derived from a condensation of the surrounding cellular substance.

A practical precept, derived from the supposed want of the hernial sac, of proceeding with great caution in exposing the contents of an umbilical rupture, which requires the operation, is just as necessary as if the anatomical observation, which suggested it, had been strictly correct. The hand of a prudent operator will be guided by this maxim in every species of rupture; but the present case certainly requires a more strict attention to such a precaution, since in many cases the integuments and hernial sac cannot be distinguished on the front of the tumour. It may indeed be noticed, as a general observation, that the coverings of an umbilical rupture are frequently very thin. The pressure of the contents in a large and old exomphalos produces sometimes a more or less complete absorption of the sac, which will account for several phenomena, that have been observed in these cases, and may likewise excuse the incorrect opinion as to the want of a hernial sac. The contained viscera have been found in many instances adhering to

the integuments*. Mr. Cooper† has seen portions of the omentum contained in an exomphalos passing through openings in the sac, which must have been produced by absorption; and has even known intestine to be strangulated in a similar aperture‡.

Besides the causes, which we have stated in the general description of herniæ, there are some of a local nature, which will act particularly in contributing to the formation of umbilical ruptures. The distention of the navel by the water accumulated in ascites has led to the subsequent occurrence of an exomphalos. The enlargement of the abdomen in pregnancy often produces this rupture, by weakening the navel or immediately surrounding fibres of the linea alba; and excessive corpulency acts in the same way in both sexes.

The contents of an exomphalos are the omentum, with or without a portion of intestine. It has happened very rarely, if ever, that an umbi-

* Arnaud *on Hernias*, p. 323; and in the *Mem. de Chirurg.* t. 2, p. 590. He mentions in the latter work an instance in which the bowel adhered to the skin so strongly that it was cut in dissecting the parts after death.—Monro *Obs. on Crural Hernia*, p. 24.—Cooper *on Crural and Umb. Hernia*, p. 37.

† Libro citato, p. 36.

‡ L. c. p. 46.

lical rupture in the adult has contained intestine unaccompanied by omentum. The transverse arch of the colon, is the gut most frequently protruded in this hernia, as we might indeed have inferred *a priori* from considering the natural situation of the part in the abdominal cavity; but the presence of the small intestine is by no means an unfrequent occurrence.

A patient labouring under exomphalos is still more subject, than in other cases of hernia, to colic, flatulence, vomiting, and the various species of intestinal derangement. Hence particular attention is required to the quantity and quality of the food, and to the preservation of the digestive organs in a healthy state.

From the description, which I have given of the umbilicus, it will immediately appear that the contents of this rupture can become strangulated only by the margin of the tendinous opening in the linea alba; it is susceptible of no other species of incarceration besides that*.

I shall divide the observations, which I have to make on the treatment of umbilical hernia, into three parts, according to the natural and essential distinctions in the complaint. These

* The case which I quoted above from Mr. Cooper, of strangulation by an opening in the sac, being a single instance, will hardly justify us in forming an exception to this general assertion.

divisions will be; first, congenital exomphalos; secondly, that which occurs in young subjects; and thirdly, that of the adult.

Section I.

Congenital Umbilical Hernia.

The first species of the complaint may be termed *Congenital*, with the greatest propriety, as it exists at the time of birth. The umbilical chord terminates in a bag, containing more or less of the abdominal contents, and communicating with the cavity of the belly by an opening in the usual situation of the navel. The tumour is not covered by integuments, but appears as if formed by a dilatation of the chord. Its coverings are so thin, that the contents can be readily perceived externally. Dr. Hamilton* of Edinburgh informs us, that for the last seventeen years, he has usually seen about two instances of this kind annually.

This form of the complaint ought not, strictly speaking, to be called a rupture, as it happens, no doubt, from an original deficiency in the for-

* Cooper, pt II. p. 57.

mation of the part*. Indeed, from the situation of the fetus in utero, and the absence of respiration, it would be absurd to suppose, that a rupture could take place before birth.

When these swellings are of a moderate size, we have the power of curing them, either by the use of bandages, or the employment of the ligature.

Mr. Hey† relates a case, in which he employed the former of these methods with success. The swelling was of the size of a hen's egg. After reducing the intestine, he brought together the sides of the opening, and covered the part with plaister spread on leather, applying other pieces over the first in a conical form. A thick circular quilted compress was then placed on the part, and maintained there by a linen belt. The funis separated about a week after birth; and at the expiration of a fortnight from that time, the aperture at the navel was so far contracted, that the crying of the child, when the bandage was removed, did not cause the least protrusion.

Dr. Hamilton‡ has related, in a letter to Mr. Cooper, a successful instance of a different mode of treatment in a very similar case. After

* Albinus delineates an example of it in an embryo less than two inches in length. *Annot. Acad.* lib. 1, tab. V. fig. 3.

† *Practical Obs.* p. 226.

‡ Cooper, part II. p. 56.

reducing the contents of the swelling, and applying a tight ligature round its base, the Doctor states that he brought together the edges of the parietes abdominis by means of two silver pins and adhesive straps, and that in a few days the cure was complete.

I should, for my own part, feel disposed to recommend Mr. HEY's treatment in preference to that of Dr. HAMILTON; as it seems to have been equally successful, and must be considered as much safer.

When, as it very frequently happens, the tumour is of a more considerable size*, its cure is more doubtful, although it would certainly be the surgeon's duty to make the attempt. Mr. HEY† returned the parts in a case where the whole intestinal canal seemed to be contained in the swelling; but the patient only lived two days. In another case, where it appears that the tumour burst during parturition, he carefully replaced the viscera, but the termination was fatal‡.

The preternatural deficiency in the abdominal muscles, causing that species of exomphalos, which we have just described, occurs in very

* HALLERI *opera minora*, vol. III. p. 315.

† *Practical Observations*, p. 229.

‡ Ibid, p. 228.

different degrees in different instances; and these variations influencing most materially the chance of a cure, must regulate our prognosis in any particular case. The first and most favourable description of this affection is exemplified in the two cases first mentioned*: and in this we are fully warranted in expecting a successful termination under the modes of treatment already explained†. In some cases the tumour has been so small, as not to produce much swelling of the chord, and even to be unnoticed at first: SABATIER‡ has seen the intestines wounded in the act of tying and dividing the chord in such instances. In the second kind, where either the whole, or the largest part of the intestinal canal is placed in an unnatural situation, we have little reason to expect that our curative efforts will be produc-

* See p. 396.

† This congenital deficiency in the structure of the navel seems to have been constantly fatal in numerous instances observed by RUYSCH. Perhaps he met with it only in its worst form. "Multoties infantulos vidi in lucem editos, "quibus abdominis cutis et musculorum pars in ambitu "funiculi deerant, magnitudine solidi argentei, ita ut intes- "tina eo loco tenuissima tantum pellicula tegerentur. Hunc "affectum sæpius a me visum, ast nunquam curatum memini: "omnes enim ab utero ad tumulum delati fuere, 5to, 6to, "7mo, 8vo, aut 9no, die." *Observ. Anatomico-Chirurg.* obs. 71.

‡ *De la Med. Operat.* t. 1, p. 152.

tive of success; yet we should not be discouraged from using every means in our power which the case admits of. There is a third and yet more extensive degree of this unusual formation, in which the very nature of the case seems to preclude all hope of assistance from the art of surgery. The dissection of such cases has shewn the liver, stomach, spleen, omentum, large and small intestines lying in the umbilical tumour*. The instances in which the whole anterior and lateral parts of the abdominal parietes are deficient, so that the viscera lie exposed on the surface of the body, seem to be only more com-

* Two cases of this sort are described by MERY; see "Description de deux exomphales monstrueuses" in the *Memoires de l'Academie Royale des Sciences*, année 1716, p. 136. HALLER has witnessed the same kind of deformity (*Opera Minora*, tom. III. p. 316.); and another instance is represented by SOEMMERRING (*Abbildung und Beschreibung einiger Missgeburten*, &c. folio, Mainz, 1791, tab. X. fig. 3.)

It may be observed, on the whole, that this umbilical-formation, both in its greater and smaller degree, is very frequent. In addition to the cases I have already quoted, instances will be found in MORGAGNI *de caus. et sed. morb.* Epist. 48, art. 48 and 52: AMYAND in *Phil. Trans. abr.* v. 7. p. 529: WRISBERG, *de peritonei diverticulis*: RUYSCH *observat. anatomico-chirurg.* obs. 71—73. VAN DOEVEREN *Specimen Obs. Acad.* p. 59: SANDIFORT, *Obs. Anat. Pathol.* Lib. III. cap. 1, tab. 1. VOIGTEL contains an immense number of references to cases of this kind. *Handbuch der Patholog. Anat.* v. 2, p. 370—372.

plete specimens of the same kind, and should therefore be classed under a common head, with the abovementioned cases. SOEMMERRING* has given us a delineation of this kind of unnatural formation. I had an opportunity of examining a specimen exactly similar through the kindness of Mr. HAINES of Hampstead; and I have seen another instance in a calf†.

SECTION II.

Umbilical Hernia in young Subjects.

UMBILICAL hernia takes place in children before the navel has completely cicatrised, and consequently before the parts have acquired their perfect degree of solidity. The efforts of the child in crying are sufficient to produce it; and and its occurrence will be particularly favoured by the removal of the umbilical bandage, which should therefore be continued as a means of prevention for some weeks after the separation of the chord, particularly where, by feeling an impulse

* Loc. citat. tab. VIII.

† Many similar facts are quoted in VOIGTEL's *Handbuch der Patholog. Anat.* v. 2, p. 313.

at the navel in crying, the occurrence of a rupture appears probable.

Although we should have expected these herniæ to occur very soon after birth, it appears from the numerous observations of DESAULT, that they take place most frequently at the second, third, and fourth months; he states indeed that the complaint appears at this period in nine cases out of ten. It is at this time that the umbilicus begins to contract in the formation of that cicatrix, which opposes the protrusion of the viscera in the adult. The abdominal contents, protruded against the opening by the repeated cries of the child, distend and dilate it, and, carrying before them a portion of the peritoneum, form a small tumour, which gradually increases in size, and possesses the usual characters of a rupture.

The presence of the protruded parts maintains the umbilicus in an open state, and opposes the natural tendency of its margins to contract. This disposition however sometimes exceeds the resistance of the hernial contents, and, forcing them back into the cavity, obliterates the opening through which they had proceeded, consolidates the parts, and thus produces a spontaneous cure. DESAULT has furnished us with two examples of this kind*. A child of two years old was brought

* *Œuvres Chirurgicales de* DESAULT *par* BICHAT, tom. II. p. 318.

for his opinion concerning an umbilical tumour, produced some months after birth, in consequence of the hooping-cough. The swelling, which equalled in size a large nut, yielded to the pressure of the finger, but returned on the least exertion of the abdominal muscles. DESAULT proposed the ligature, but could not obtain the consent of the relations; when this patient was seen for another complaint, the following year, the tumour had completely disappeared. The parents stated that no external application had been used, but that the swelling went away spontaneously.

In another patient, aged five years, an umbilical rupture had subsisted from the time of birth. The application of the ligature, which had been recommended by DESAULT, was delayed in consequence of the appearance of the small-pox. When the child had completely recovered, it was found that the tumour had diminished in size, and that the opening, through which the viscera had protruded, had become considerably contracted. Struck by this phenomenon, DESAULT conceived that nature alone might accomplish a cure, and did not interfere with the progress of the case. In the course of a few months the swelling had entirely disappeared.

These spontaneous cures are however by no means frequent. When the progress of a case is

left to nature, the cure in the course of time becomes nearly impossible. The disposition, which the umbilical ring has, to close, is gradually lost; so that the aperture would not become obliterated at this period, even if the protruded viscera were kept in the reduced state. Hence we perceive that there is a very essential difference in the nature of the umbilical rupture, as it occurs in the infant or the adult; and that this distinction is derived from the tendency to contraction in the tendinous ring. In the former case a radical cure is easily obtained; in the latter it is nearly impossible. In the one instance it is sufficient to keep the viscera within the abdomen, and the ring will contract of itself. In the other the opening remains, whether it be occupied by protruded viscera or not. Hence also it follows, that practical observations, drawn from one form of the complaint, cannot be applied to the other.

In treating that species of exomphalos, which we are now considering, our object is to obtain a radical cure. By returning the protruded parts, and keeping them reduced, the umbilical ring will contract, and become obliterated, so as to prevent any future protrusion. There are two methods by which this may be attempted, viz. compression, by means of bandages; and the

ligature. The latter has in its favour the sanction of antiquity, but was almost superseded by the general adoption of the former method, when the celebrated DESAULT again brought it into use, and recommended it very warmly on the authority of his extensive experience. I shall present the reader with the result of the practice of the French surgeon, in his own words; and hope that the length of the extract will be excused, from the celebrity of the author, and the importance of the subject; particularly when it is considered, that the work* from which it is taken has not been translated into the English language.

"The ligature and compression are both employed with the same object; that of preventing the viscera from remaining within the umbilical ring, and thereby favouring the approximation of the sides of the opening. In the first of these methods, the hernial sac, and the integuments which cover it are removed; and the cicatrix formed after their destruction, opposes the displacement of the bowels, while the margins of the opening, obeying the natural impulse which leads them to contract, and irritated by the operation which they have undergone, ap-

* *Œuvres Chirurgicales de* DESAULT, *par* BICHAT.—See the "*Memoire sur la Hernie Ombilicale des Enfans,*" tom. sect. IV.

proach to each other, and unite, so as to obliterate the ring. In the treatment by compression, the place of the deficient portion of the parietes abdominis is supplied by a foreign body applied externally, which keeps the intestines within the abdominal cavity, so that they cannot offer any obstacle to the contraction of the umbilical ring. The two processes are founded therefore on different principles, and reason and experience prove that their results differ accordingly.

" It must be allowed, that compression is attended with no pain, but it produces inconvenience and restraint during the whole long space of time for which it must be continued. The ligature causes a momentary pain, but is attended with no subsequent restraint; it produces in a few days what compression only effects, when it succeeds, in several months.

" In the one case, a constant and long-continued attention is required; if the treatment be suspended for the shortest interval, a great risk is incurred of losing the benefit previously gained: in the other, on the contrary, the object is attained to a certainty in spite of the cries of the child, and independently of the attention of its nurses. The margins of the opening being compressed in the former method, the natural action of the parts must be impeded; while in the latter, by superadding an artificial irritation to the ten-

dency which the parts naturally have to contract, the obliteration of the opening is hastened and assisted.

"When compression is employed, it is produced by means of a flat body, or of a round or oval substance adapted to the form of the opening. In the former case, if the bandage is applied with precision, the skin and sac, forming a fold, are pushed into the opening, and impede its obliteration by producing the same effect from without inwards, which the protruded viscera did from within outwards. The other method is exposed still more strongly to the same objection. By the ligature, the hernial sac and integuments are removed, and there is no obstacle to the obliteration of the opening. If the means of compression be not applied accurately, and kept uniformly in their proper situation, a portion of omentum, or bowel, may escape, and frustrate the object of our attempts. Supposing the compression to succeed, both methods accomplish the closure of the navel: but, under the employment of the ligature, there is superadded to the contraction of the aperture, an agglutination of its sides produced by the operation, and conferring a degree of solidity on the union, which can be obtained by no other process.

"Experience confirms the theoretical statement which we have just given of the comparative

merits of the two methods of treatment. On one side, we shall find the successes of compression occur amongst its failures; and we shall see the infants, on whom it is employed, suffering for years the trouble and inconvenience inseparably attending on it. The ligature, on the other hand, as employed at the Hotel Dieu, presents an uninterrupted series of well attested cures, which have amounted in the practice of DESAULT to more than fifty. In the latter years of his life, parents often brought their children to the public consultation, where the operation was performed immediately, and without any preparation. The patients were afterwards brought daily to the hospital, to be seen and dressed until the cure was completed.

"To these considerations must be added others, which will have some weight in influencing our determination. A poor person insures the cure of his child, by passing a few days in a hospital, under the employment of the ligature: while, if compression be used, he is exposed to the frequent repetition of expense for the purchase of bandages, and to loss of time in paying the attention which this mode of treatment indispensably requires.

"The antients employed the ligature in various ways; but the proceedings which they have transmitted to us, may be referred to two

heads. One consisted simply in returning the viscera, and placing a ligature on the integuments and sac: in the other, the swelling was opened either before or after the application of the ligature, to ascertain that the parts were all completely returned. Celsus* adopted the first of these methods: Paul of Egina chose the second, and was followed by all the Arabian physicians, and by those more modern practitioners, whose knowledge was derived from Arabian authors. The works of Avicenna, Albucasis, and Guy de Chauliac prove this assertion.

"We shall not be long at a loss in determining which of these methods deserves our preference. One is less painful, and equally certain; for surely a person can have no difficulty in deciding, by pressing the sides of the sac against each other, whether or no the protruded parts are completely returned. The other, with an useless cruelty, adds to the pain without increasing the certainty of the operation. This last has been generally adopted; and Pare, who describes it, does not even mention the other method. Other variations again took place in the manner of operating. Some simply tied the base of the tumour, while others transfixed it with one or two needles in order to make the ligature more secure; and

edicinâ lib. VII. Cap. 14. *de umbilicivitiis.*

sometimes even made circular incisions with the same object. It is particularly in the Arabian writings that we meet with this process, which is not only cruel but superfluous; as the ligature, when properly applied, never fails. It is also described by PARE; but SAVIARD, the only modern practitioner who has treated the exomphalos by means of ligature, followed the method recommended by CELSUS. SABATIER, in his learned work on the operations, speaks of both methods without deciding which merits the preference. The operation of DESAULT, nearly resembling that of SAVIARD, is simple, and attended with very little pain; it is performed in the following manner:

"The child, on which it is to be performed, should be laid on its back, with the thighs a little bent, and the head brought forwards on the chest. The surgeon, having returned the protruded viscera, presses on the opening with one hand, while with the other he raises the sides of the sac, and slides them between his fingers to ascertain that no part remains unreduced. When he has assured himself that the parts, which he holds, consist of nothing but the integuments and hernial sac, his assistant passes a waxed ligature of moderate size several times round their basis, securing it at each turn with a double knot, drawn with sufficient tightness, to

cause an inconsiderable degree of pain. The tumour, being thus tied, should be covered with lint; over which there should be applied one or two compresses fastened on by a circular bandage, which should be secured by means of a scapulary.

" On the succeeding day a slight swelling of the tumour is perceived, analogous to that which occurs in a polypus, after tying its basis, and attended with no pain. On the second day the parts shrink, and the ligature becomes loose: its place should be supplied by another drawn rather more tightly. The application of this second ligature is generally rather more painful from the increased sensibility of the parts consequent on the first operation. The swelling now soon loses its colour, and becomes livid and flaccid; and a third ligature entirely intercepts the circulation. The part usually falls off about the eighth or tenth day, and leaves a small ulcer, which soon closes under the application of dry lint. The umbilicus has acquired by this time such a firmness that it does not yield at all to the impulse occasioned by coughing or any other exertion of the abdominal muscles. It is, however, advisable, as a matter of precaution, to continue the use of a circular bandage for the two or three months immediately following the cure, lest the salutary operations of nature, employed at this time in the gradual obliteration of the

umbilical opening, should be retarded by the pressure of the viscera against the parts.

"We could recount a multitude of cases, in which the practice above detailed is confirmed by experience. But several have already been published in the Surgical Journal*, and an addition to their number would only lengthen these remarks unnecessarily. It is sufficient to state, that since the publication just alluded to, DESAULT has performed the operation in a vast number of instances with uniform success. Children were brought to him every week at the public theatre where he lectured, and had the ligature applied in the presence of the students; they were then taken home, and brought back daily to be dressed until the cure was complete.

"It may still be doubted, says SABATIER, in quoting an article from the Parisian Journal, where DESAULT speaks on this subject, whether the children have been radically cured: the hernia may have returned at some future period. A multitude of facts may be adduced to dispel this suspicion: several patients were brought to the public consultation of DESAULT for other complaints, long after the period of the operation, and were found on examination to have the umbilical opening completely obliterated, and to be free from the slightest impulse of the viscera

* There is an account of nine cases treated in this manner in the *Parisian Chirurgical Journal*, vol. II. p. 189—199.

against the aperture, in consequence of coughing, sneezing, &c. Most of the surgeons of the Hotel Dieu are acquainted with patients radically cured by the operation of Desault; and I myself know two young persons operated on four years ago, and now entirely free from the complaint.

"The event of this operation, which succeeds almost invariably in infants of an early age, becomes less certain in proportion as they grow older. This observation will be confirmed by the following cases.

"A child of eighteen months was brought to the clinical lecture of Desault, to undergo the operation for umbilical hernia, which was performed by means of the ligature, in the usual manner. The tumour fell off on the seventh day; and on the seventeenth the ulcer had cicatrised. At the expiration of six months this patient was brought again to the hospital, and was found by the pupils to have no trace remaining of its former complaint.

"A boy four years old was operated on in the same way. The separation took place on the eighth day; and on the twentieth the parts had completely healed. An impulse of the viscera against the opening, which had not become entirely closed, could be perceived two months afterwards, in spite of the precaution of wearing

a bandage, which had been observed constantly since the operation. At the end of the sixth month, however, this symptom had entirely disappeared.

" A girl of nine years old was brought from the country for an umbilical rupture, which had subsisted since the time of birth. DESAULT, whose opinion was asked on this case, advised the operation, which he had never hitherto practised at so advanced an age. It was performed with success, and the wound healed speedily: but two months afterwards the swelling began again to appear. A bandage was applied, but in spite of this the swelling in six months had become as it was originally.

" The latter fact appears to contradict the experience of CELSUS, who operated as late as the fourteenth year. It illustrates however the principle formerly laid down, that the disposition, which the umbilical aperture has to become closed, is lost after a certain period. In the three preceding cases the event seems to have been completely influenced by the age of the subjects. A perfect cure took place at eighteen months; it was obtained with difficulty at four years; and a complete failure took place at nine. In several other instances, where operations have been performed at so late a period, the result has been the same."

When an exomphalos in a young subject is treated by means of compression, we may expect a radical cure as in the use of the ligature*; whereas, in a more advanced age the employment of trusses serves merely to keep the parts reduced. Circumstances do not admit the use of an elastic bandage at this age. The surgeon should take a convex solid body adapted to the size of the opening. RICHTER particularly recommends half a nutmeg wrapped in a piece of linen, for this purpose; and Mr. COOPER a portion of ivory; a piece of cork may also be used for the same purpose. When the viscera are carefully returned, let this body be placed over the opening, and be covered with a circular portion of sticking plaister. It may then be secured in its place by a belt surrounding the body. As the child's motions are apt to occasion a change in the position of this belt, it should be made broader in front, that it may set more uniformly; and it may be either quilted, or be strengthened by a piece of leather at this part to prevent it from becoming wrinkled.

In proportion as the child is younger, so much the more speedily and certainly do these means

* J'ai vû beaucoup d'enfans attaqués d'exomphales, et je " ne m'en rappelle pas un qui n'ait été guéri par l'usage du " bandage, on ne peut point en dire autant des adultes,"

RICHTER, *Tr. des H.* p. 236.

produce a radical cure. The chance of success is diminished according to the age of the child, and the duration of the complaint. If the treatment be not adopted at an early age, the complaint will probably continue through life.

When we are endeavouring to obtain a radical cure by means of compression, it is important, that the parts should be kept constantly reduced; for if they are suffered to protrude at any time, the progress of the cure must be retarded. Hence, when a change of the bandage is required, we should carefully prevent any protrusion by placing a finger on the part, and keeping it there until the clean bandage is fastened.

Section III.

Umbilical Hernia in the Adult.

An umbilical hernia occurring in the adult must be treated on the same principles as an inguinal or crural rupture.

When reduction is attempted, the patient should be placed in the recumbent position, with the shoulder and pelvis a little elevated, and the thighs bent on the trunk, so as relax the abdominal muscles as much as possible. The circum-

stance of the opening being ordinarily at the upper part of the tumour must be regarded.

When the tumour is small in size and reducible, it may be kept up by means of a truss made like that for bubonocele. The pad and neck of the truss should be continued in a straight line with the rest of the spring; and the latter part ought to extend beyond the spine*. When the patient is very fat, so that the navel is depressed, the concavity may be filled, according to the suggestion of Mr. Cooper, by an hemisphere of ivory, on which the pad of the truss should rest.

When the size of the tumour is larger, the best truss hitherto devised is one represented in the work of Mr. Hey; for which we are indebted to the ingenuity of W. Marrison, instrument maker at Leeds. An oval ring of steel is made to fit the front of the belly; from one side of this a spring extends towards the centre of the oval, and has connected to its extremity the

* Richter has found a truss of this kind to answer very well in umbilical ruptures. "En faisant à ce bandage (the "common inguinal truss) un léger changement dans sa figure, "on peut le rendre très propre à l'exomphale. Il faut donner "a la pelotte une forme ovalaire ou même ronde, et ôter la "courbure du col de manière que le ressort représente un "demicercle élastique, et on obtient par ce moyen le meilleur "bandage pour l'exomphale, que l'on puisse désirer: c'est le "seul dont je me serve, et que je recommande comme le plus "sûr." P. 240.

pad, which is meant to press on the opening. By means of this a strong and constant force is applied, which keeps the viscera constantly reduced. In the instrument, as described by Mr. HEY, a spring extends from either end of the oval ring towards the back, where the two nearly meet together. This part of the truss has been sometimes found inconvenient; and the end has been answered equally well, when its place was supplied by a broad leather belt fastened to one end of the oval ring, and buckled to the other, after passing round the body*.

An irreducible exomphalos of moderate size may sometimes be conveniently supported, and prevented from enlarging, by means of a truss with a hollow pad. If however its magnitude be considerable, other means of supporting the tumour must be resorted to; such as suspending it over the shoulders by bandages passed under the swelling.

The treatment of a strangulated umbilical

* Umbilical trusses of a more complicated construction have been devised; one is described in the 2nd vol. of the *Mem. de l'Acad. de Chir.* by Mr. SURET; and it was approved by the academy. JUVILLE has a similar one in his treatise. The object of both these is to admit of the truss enlarging and contracting according to the varying dimensions of the abdomen. RICHTER has rendered this truss more simple. P. 239.

rupture must be conducted on the principles laid down in the general observations on this subject; and if we fail in our attempts, the operation must be resorted to. This does not succeed so frequently as in the inguinal or crural herniæ: and Mr. Pott ascribes the greater frequency of failures to the circumstance of the symptoms arising more generally from disorder of the intestinal canal, than from strangulation. Hence he thinks that the necessity of operating is not so urgent in this, as in the other kinds of rupture. The cases which have fallen under my own observation lead me to concur entirely with that celebrated writer in his opinion concerning the great fatality of the operation for strangulated exomphalos*.

The surgeon will remember in performing this operation that the coverings of the hernia are often very thin, and that the integuments and sac are generally inseparably consolidated on the front of the swelling. His incision may extend longitudinally over the whole tumour, beginning

* In the cases, which I have seen, the operation has been uniformly fatal. Amyand has recorded two instances of exomphalos, with mortification of the intestine, followed by complete recovery. *Philos. Transact.* v. 39, pp. 338, 341. Another may be seen in the *Recueil Periodique*, t. 7, p. 53; and a fourth, in which an artificial anus remained, in the same

half an inch or an inch above the opening in the linea alba; or it may resemble, in conformity with the advice of Mr. Cooper, the letter T inverted; the longitudinal portion of the cut terminating on the middle of the swelling, and a transverse incision crossing the tumour at right angles with the former, so as to join its lower end. The stricture may be removed by cutting upwards: there is indeed no danger in giving the incision any other direction*. The curved blunt-ended bistoury, carefully conducted by the left fore finger, which should protect the protruded parts, may be employed for this purpose. The edges of the incision should be carefully brought together after the operation.

As the risk, with which this operation is necessarily attended, makes it advisable to diminish the subsequent inflammation and irritation, as far as lies in our power, I should be strongly inclined to employ in a case of exomphalos, if the tumour at all exceeded a moderate size, that particular mode of operating which I described as applicable to large inguinal herniæ: in which the tendon is divided without opening the sac; or the latter part is only cut sufficiently to allow

* Some authors cut ~~in such~~ in such a direction as to avoid the umbilical vein—a caution, which is altogether superfluous.

the division of the stricture*. This will permit the return of the parts if they are not adherent; and if adhesions should have formed, the immediate cause of danger, the strangulation, is removed. The practicability of this mode of operating in umbilical ruptures is fully proved by two cases recorded in the work of Mr. Cooper†; and the successful termination of both instances proved the judgment and sagacity which had suggested that peculiar treatment.

* There can, I think, be no doubt, that in the unfortunate case of exomphalos, related in the chapter on omental ruptures, the patient would have had a much better chance of surviving, had the operation been performed in this manner.

† Part II. p. 51 and 55.

CHAP. XVIII.

ON CONGENITAL* RUPTURES.

SECTION I.

Congenital Hernia in the Male Subject.

THIS case differs from the common scrotal rupture merely in the circumstance of the protruded parts being contained in the tunica vaginalis testis, and consequently lying in contact with the testicle itself, covered only by its

* The term *hernia congenita* was applied to this affection by HALLER (*de herniis congenitis*, Götting. 1749, 4to. *Opuscula patholog.* Lausan. 1755, 8vo.); and the name is sufficiently justifiable, if we consider that the state of parts favouring its occurrence exists at birth, although the rupture itself may not be formed till a subsequent period. From this Latin term the English epithet *congenital* has been derived. I cannot understand for what reason Mr. POTT and some others have exchanged this for the appellation *congenial*; which, according to its common use and acceptation, must be perfectly absurd, as applied to this or any other kind of rupture.

tunica albuginea. The hernial sac is formed therefore by the vaginal coat of the testicle.

The differences between a congenital and an ordinary scrotal rupture are, it must be confessed, less important in practice than in pathology; for the symptoms and treatment are very nearly the same in both species.

The fact of the viscera being occasionally found in contact with the testicle, was observed by surgeons long before the circumstances, leading to this peculiar modification of the complaint, had been investigated and explained. As the sac of the scrotal hernia lies in close contact with the tunica vaginalis, the older practitioners supposed that the pressure of the protruded parts might cause a preternatural communication between the two cavities; and thus they attempted to account for the phenomenon in question. The true nature of the complaint was ascertained about the middle of the last century; when the labours of several celebrated surgeons and physiologists threw much light on the whole subject*. It is

* See HALLER *Programma, herniarum observationes aliquot continens*, Goetting. 1749; and in *opusc. patholog.* See also his *opera minora*, tom. III.—POTT's *Account of a particular kind of Rupture, frequently attendant on new-born Children*, &c. London, 1765.—CAMPER in the *Harlemische Abhandlungen*, vol. VI. and VII.—HUNTER's *Medical Commentaries*, Lond. 1762 and 1764.—CAMPERI *icones herniarum*, tab. X. and XI.

now well understood that the testis is situated originally in the neighbourhood of the kidney, where it receives a covering from the peritoneum in the same way as the other abdominal viscera derive their external investment; that in the latter months of uterogestation, it passes through the abdominal ring into the scrotum, carrying with it a portion of peritoneum; that the communication between the membranous bag, holding this gland, and the abdominal cavity is destroyed before the time of birth; and that the peritoneal coat, which surrounded the testis in the abdomen, gives the gland its external polished

—Neubauer *Dissert. de tunicis vaginalibus testis et funiculi spermatici*, Giessen, 1767.—Lobstein *de Herniâ Congenitâ, Dissertatio Anatomico-Chirurgica*, Argentorat, 1771: contain an excellent account of the subject, as well in an historical, as in an anatomical and surgical point of view.—Palletta *nova gubernaculi testis Hunteriani et tunicæ vaginalis descriptio anatomica, Mediolani*, 1777.—Wrisberg *Observat. Anat. de testiculorum ex abdomine in scrotum descensu ad illustrandam in Chirurgia de herniis congenitis utriusque sexus doctrinam.* in the *Commentationes reg. soc. scient*, Götting. 1778; and in Wrisbergii *Commentationes*, vol. I.—Brugnoni in *Mémoires de Turin*, 1784 and 1785.—Rol. Martin *Commentarius de herniæ, sic dictæ congenitæ, ortu et sede, et de partium corporis fœtus, quæ ad ejus illustrationem pertinent, administratione anatomica*; in *Nov. act. reg. soc. scient. Upsaliensis*. v. 3.—Sandifort, *icones herniæ congenitæ*, 4to. L. B. 1781. —Vicq d'Azyr *Recherches sur la structure et la position des testicules*, in the *Mem. de l'acad. des sciences*, 1780.

surface, while the more loose process, that passes with it into the scrotum, forms the tunica vaginalis testis*.

* The numerous descriptions of the descent of the testis, which are already before the public, render it quite unnecessary for me to enter on that subject on the present occasion. I shall merely present the reader with the observations of WRISBERG concerning the period at which this body changes its situation, and the varieties which occur in the process.

Before the beginning of the sixth month the testis is always contained in the abdomen; and is generally near the kidney, but it may be behind the ring: this circumstance therefore affords a criterion respecting the age of a fetus. But the rule does not seem to be entirely without exception: for ARNAUD mentions, in his French translation of HUNTER's account of this subject, that J. HUNTER had met with a fetus of six months, in which one testis had passed completely into the scrotum, (see *Mem. de Chirurgie*, t. I. note to p. 25); and WRISBERG himself, on a subsequent occasion, states that he had found both testes in the scrotum in an embryo of four and in another of five months. (See LODER's *Journal für die Chirurgie*, B. 1, St. 2, p. 175.)

In the interval between the beginning of the sixth, and the end of the seventh month, it may be seen above the ring, or in its passage through the opening, or just below it. When it has passed the tendon of the external oblique, it may still at first be pushed back into the abdomen, as the opening of communication is not yet closed. In the eighth month these organs have generally passed the ring, but have not descended into the scrotum; the tunica vaginalis communicating with the abdomen, or the intermediate canal being closed ordinarily. Both testes have arrived at the bottom of the scrotum in the

When, as it sometimes happens, the communication between the tunica vaginalis and the abdomen remains open after birth*, the occur-

ninth month, and the communication has closed; but it may be open on one or both sides.

Of one hundred and three children, which WRISBERG carefully examined for this purpose at the time of birth, seventy-three had both testicles in the scrotum; in twenty-one, one or both were in the groin; in twelve, one or both were in the abdomen.

In eight of the last division the descent took place within the five first days after birth; in one it happened in the sixth week; and in the remaining three the testis had not appeared at the fourth or fifth week, when the infants left the hospital. In two there was a hernia on the right side.—*Commentat. soc. reg. Scient.* Gotting. 1778.

* It should appear, by the observations of CAMPER, that the canal of communication is generally open at the time of birth. He dissected seventeen newly born children for the purpose of ascertaining this point. He found the canal open on both sides in eleven of these: it was obliterated entirely on one side, and only in part on the opposite in five; and in one only it was completely destroyed on both sides.—"*On the causes of the ruptures which occur so frequently in new-born children,*" in the *Transactions of the Dutch Society of Sciences at Haarlem*, v. 6 and 7; in Dutch. These papers are also contained in his *Dissertationes* edit. a HERBELL, 8vo. Lingæ, 1800. My own dissections do not agree with this statement; I have generally found the canal closed at the time of birth. CAMPER asserts further, that the canal is closed earlier on the left than on the right side, and explains, from this circumstance, the more frequent occurrence of herniæ on the latter side.

rence of a hernia is very probable, as there is a sac ready formed to receive any protrusion of the viscera; and the complaint assumes, under these circumstances, the peculiarities which constitute a congenital rupture. It is still necessary, that the causes, which give rise to herniæ, should act in this case as well as in any other; since the mere existence of the communication is not sufficient for the production of a congenital rupture. In quadrupeds the tunica vaginalis communicates with the abdomen, and yet protrusions of the viscera are very rare*. In like manner the canal sometimes remains open in the human subject, to even the adult age, without the occurrence of rupture. The term *congenital* therefore is not applicable to this hernia in its strict sense; as it does not usually exist at the time of birth; it generally appears soon after this period, but it may be delayed, even for many years†.

It seems probable, that an accidental circumstance may give rise to the complaint, where it is strictly congenital. WRISBERG observed a small

* WRISBERG saw a scrotal hernia in a horse; and observes that monkeys have been affected in the same way.

† "Rarissimé, si unquam, talis hernia in recens natis jam "adest, sed testem serius protrusum aut presso pede sequitur, "aut accidente aliquâ causâ occasionali, contenta post menses "vel annos in saccum haud occlusum propelluntur."—CALLISEN, *pars poster*, p. 494.

prominent fold of the peritoneum, continued from the upper end of the testis to the end of the ilium or the cæcum, in some subjects, and forming a preternatural connexion between these parts. The change of situation in the testis would be probably attended, in such a case, with a descent of the connected intestine. An adhesion of the omentum or intestine to the testicle in the abdomen may cause these parts to pass through the ring, when the testis itself descends, or may even retard, or totally prevent the descent. In an infant, which had only one testicle in the scrotum, and died a few hours after birth, WRISBERG* found the opposite one close to the ring, and connected to the omentum by means of three slender filaments. In two congenital herniæ, which existed at the time of birth, when the contents were returned the testis was drawn up towards the ring†. The same author also found the omentum adhering firmly to the testis, in a case which he examined in the adult, although there was no adhesion to any other part‡. It was a preternatural connexion of the omentum, by a single thread to the testicle, that rendered the rupture of the celebrated ZIMMERMAN irre-

* *Comment. reg. soc. scient.* Goetting, 1778, p. 71.

† Ibid. p. 43—44.

‡ Ibid. p. 71.

ducible; and for which he submitted to the operation on account of the various troublesome and painful symptoms which the complaint occasioned*. SOEMMERRING† found the appendix vermiformis adhering to the testicle. It would be useless to adduce any further instances in confirmation of this opinion, as the experience of most individuals must have furnished opportunities of observing how frequently the viscera are connected to the testis in congenital ruptures. I shall therefore content myself with referring on this point to the opinion of Mr. POTT; who not only states in general terms, that adhesions are much more frequent in this than in other ruptures, but particularly notices the strength of the connexion, which frequently subsists between the prolapsed viscera and the testis, and the difficulty which is experienced in destroying it‡.

The variations, which occur in the descent of the testis, lead to considerable differences in the circumstances under which inguinal herniæ are presented to our notice. The complaint may take place when this organ is still contained in the abdomen. A congenital rupture may exist when

* MECKEL *de Morbo Hernioso congenito singulari*, &c. Berolini, 1772.

† DANZ *Zergliederungskunde des ungebohrnen Kindes*, vol. II. p. 164.

‡ *Works*, vol. II. p. 162, and vol. III. p. 292, and 299.

it has but just passed the ring; and the gland may then interfere with the measures necessary for returning or keeping up the rupture. A rupture may pass into the scrotum, while the testis is at the ring: or both may descend together*. Lastly, the testis may present occasionally at the opening, when a rupture has formed, and cause unpleasant symptoms from its pressure†.

The anatomy of congenital hernia is the same with that of the first species of bubonocele, in every respect, excepting the circumstance of the testis being contained in the same membranous cavity with the protruded viscera.

The symptoms and treatment of this rupture are the same which belong to the complaint in general.

It may be distinguished from a scrotal hernia by the impossibility of feeling the testicle, which

* Reichel *de descensu testiculi in puero, cum hern. incarc. lethali;* in Ludwig *Advers.* v. III. p. 731.

† "I remember," says Richter, "a young man, twenty "years of age, who had a small hernia and no testicle on the "left side of the scrotum. The testicle was contained in the "abdomen, and sometimes presented at the ring, causing "violent pain and symptoms of strangulation, which rendered "it necessary to push the gland back again. This object, "however, could seldom be accomplished until more than "twenty-four hours had elapsed, and emollient cataplasms "had been employed. The symptoms immediately ceased, "when the return of the testis was effected."

part can be clearly discerned in common cases. The existence of a rupture from infancy affords also a strong suspicion that it is of this kind. And we have great reason to conclude, that a scrotal hernia in a child is congenital, although the case, related in the third chapter of this book, shews that the rule does not hold good invariably*.

A congenital epiplocele may be mistaken for a diseased testis; the history of the complaint will lead to the proper discrimination.

Fluid may be collected in the tunica vaginalis while its cavity still communicates with the abdomen; and it may form there during the use of a truss for a congenital hernia. As the contents of the tumour pass into the belly on pressure, such a case may be confounded with hernia. The fluid comes down again into the scrotum, when the pressure is removed, although the patient makes no exertion; and this, together with the fluctuation and transparency of the swelling, are sufficient for the purpose of discrimination. The fluid will generally be absorbed in young subjects.

As there seems to be always a disposition in that membranous canal, which connects the tunica vaginalis to the abdomen, to contract and

* See p. 59.

close, this effect will probably take place in a young subject, if the viscera be replaced and maintained in their natural situation, by means of a proper truss. A radical cure of the complaint will thus be effected in a very short time. The same event cannot be looked for at a more advanced age, where the employment of a truss, as in other species of the complaint, must be regarded merely as a palliative measure.

Before the surgeon applies a truss for an inguinal or scrotal rupture in a young subject, he must not only satisfy himself that the protruded parts are fairly replaced, but that the testicle itself has arrived at its natural situation in the scrotum. A rupture may take place in an infant when this gland has not yet quitted the abdomen. I have already mentioned two cases of scrotal hernia, in which the testis on the affected side had never passed the ring. Mr. POTT* and HALLER† have furnished us with similar instances. The application of a truss to a young subject, thus circumstanced, might prove injurious by retarding the descent of the testis. If it should have arrived only so far as the groin, the pressure of the pad on the gland may be attended with still worse effects.

* *Account of a particular species of rupture*, &c. p. 34.

† *Opera Minora*, vol. III. p. 318.

I have only two or three remarks to make concerning the operation for congenital hernia. The hernial sac should be divided only so far as the upper end of the testis; a sufficient portion of the tunica vaginalis to cover that organ completely being left unopened. The incision must extend lower, if adhesions exist.

The parts are often girded by a contraction of the hernial sac, not only where it communicates with the abdominal cavity, but also in other situations, where we should not have expected this occurrence. Mr. WILMER* informs us that he has generally found the stricture in these ruptures to reside in the neck of the sac, and not in the tendon of the external oblique: and Mr. POTT† mentions an instance of remarkable narrowness in the upper part of the sac.

The last mentioned author has seen and recorded many cases where the hernial sac was contracted lower down, so as to embrace the protruded parts with great tightness. The intestine has been so closely girded by this kind of stricture after death, that it could not be withdrawn without laceration: and the omentum, from the same cause, has been converted into a firm hard sub-

* *Pract. Obs.* p. 10: and Mr. ALANSON states that nearly all the cases he has seen of stricture in the neck of the sac have been congenital herniæ. Ibid. p. 96.

† *Works*, vol. III. p. 299.

stance, while above and below the contracted part it still exhibited its natural expansile state*. WRISBERG† noticed the same circumstance in a patient whom he examined. There were two contractions of the hernial sac; and the narrowest of these, forming a hard callous ring, was in the situation where the tunica vaginalis testis ordinarily terminates just above the testis‡. He ascribes the constriction to the partial accomplishment of the natural process of obliteration. The following is the only instance of the kind, which I have met with.

CASE.

—— HEWER, aged twenty-four, the son of a farmer in Gloucestershire, had been occasionally troubled with a descent of the intestine into the scrotum, since the age of twelve years. Although

* *Works*, vol. II. p. 161; vol. III. p. 293, et seq.

† Lib. citat. p. 69 et 70.

‡ LE CAT found, on dissection, a complete strangulation through such an aperture. The patient died from this cause; while the free state of the ring, together with the entire absence of pain and tension from the upper part of the tumour, led the surgeon to conclude that the swelling had no connexion with the symptoms. *Philos. Trans.* v. 57.

it appeared afterwards that this rupture was of the congenital kind, it did not take place until the abovementioned age, and had descended only a very few times.

The parts came down, whilst he was riding, on Monday, September 15, 1807; and the symptoms of incarceration very rapidly supervened. The most vigorous methods were resorted to without delay. Large bleeding from the arm, and cold applications to the part produced no benefit; and the free use of tobacco, both in the form of smoke and infusion, was equally inefficacious. The latter remedy was employed until its full effect was exerted on the system, as appeared by a considerable reduction in the strength and number of the pulse, cold sweat, pallid countenance, great feeling of anxiety and distress, and a state of faintness approaching to actual syncope. It is by these symptoms, and not by the length of time, nor by the quantity of the remedy consumed, that we can judge whether a fair chance is given to the patient of profiting by the powers of the tobacco.

The operation was performed on the evening of Wednesday, Sept. 17. About half way between the testis and groin, the hernial sac was so contracted, that a probe only would pass into the stricture; and the prolapsed parts expe-

rienced, in this situation, as close a constriction as that which they suffered from the margin of the ring. This unexpected circumstance was at first rather embarrassing; for, as the upper division of the sac was first opened, and the communication, in consequence of the closeness of the contraction, could not be immediately discovered, a doubt arose as to the nature of the lower part of the swelling.

When the hernial sac was completely laid open, a fold of intestine was found in contact with the testis, and covered by a portion of omentum. Both these parts were of a dark reddish brown colour. The stricture, which was formed at the upper opening of the ring, would not admit the smallest portion of the tip of the finger, so that I found it necessary to employ the grooved director and curved knife for its enlargement. The intestine, which was marked by a strong impression from the situation of the stricture, was then returned with ease; and the omentum was cut off on a level with the ring, its divided margin affording no hemorrhage; the latter part was immediately retracted within the abdomen.

A common clyster was injected, and small quantities of a solution of the magnesia vitriolata in mint water were repeatedly exhibited during

the night; but no discharge from the bowels took place till the following day, when the patient was much relieved by several copious evacuations. His recovery proceeded in the most favourable way. A single venesection with fomentations to the abdomen was sufficient to obviate a slight tendency to inflammation. A very light and sparing diet was rigorously enforced; and no other medical assistance was required, excepting the use of the saline effervescing draughts with occasional doses of opening medicine. The abdomen continued perfectly soft and free from tension, except just above the wound; here it was rather hard, and pressure excited slight pain, for which leeches were twice applied with benefit.

He was so completely recovered by the 2nd of October, as to bear being removed to his own home, which was several miles distant from the place where the strangulation came on.

As the parts, in a case of congenital hernia, are always protruded on the outside of the epigastric artery, the stricture may be safely divided towards the ilium, as well as directly upwards.

Section II.

Case, in which the Parts, together with the containing Sac, are contained in the Tunica Vaginalis.

I shall just notice here a peculiar species of hernia which has been described only of late, and the appearance of which might considerably perplex an operator, unless he were previously aware of the possibility of the occurrence. In the cases, to which I now allude, the protruded viscera, surrounded by their hernial sac, are contained in the tunica vaginalis testis. The rupture therefore must be formed when the communication with the peritoneum is closed; but before the contraction has been continued from the abdominal ring downwards. The first instance of this kind was described by Mr. Hey*, and another has been since related in Mr. Cooper's† work.

It would be necessary, in this case, after laying open the tunica vaginalis, to divide also

* See his "Account of a new species of Scrotal Hernia," in the *Practical Obs.* p. 221, et seq: first published in Gooch's *Works*, v. 2. p. 217.

† Pt. I. p. 59.

the sac, which more immediately invests the prolapsed viscera.

Section III.

Congenital Hernia in the Female.

The distinction of this rupture in the female is of still less practical importance than in the male subject. Indeed there are no marks by which it could be ascertained; nor would its treatment differ in the least, if that distinction could be made.

Nuck* first pointed out a small production of peritoneum continued through the abdominal ring over the round ligament of the uterus, and terminating by a blind extremity at the groin. He called it a diverticulum; and described it as being about half an inch in length, and by no means constant. The same circumstances have been subsequently observed by others. Camper† saw these diverticula in three out of fourteen newly born children: and Le Cat‡ observed, in a woman of

* *Adenographia Curiosa*, cap. X. "*de peritonæi diverticulis novis.* fig. 35, 39, 40.

† *Haarlem Transactions*, v. 6 and 7.

‡ *Philos. Transact.* v. 47.

forty-six, a canal of the size of a goose's quill, leading through the ring into a small cavity that would admit the finger. WRISBERG* has particularly investigated the subject. In nineteen out of two hundred female bodies, he found an opening, generally on both sides, but sometimes on one only, leading through the ring into the groin or labium, lined by peritoneum, and placed over the round ligament. These canals in different instances would admit a probe, a quill, or the finger.

It has not been ascertained that these diverticula become closed, as the communication between the tunica vaginalis and the abdomen does. Nor does it seem probable that their existence much favours the occurrence of ruptures.

* *De testicular. descensu*, &c. § 34.

CHAP. XIX.

ON VENTRAL RUPTURES.

UNDER the epithet *ventral* are arranged all those ruptures, which, appearing at the front or sides of the belly, are not protruded through the umbilicus, the abdominal or the femoral ring. They come through openings in the abdominal muscles, and there is no part of these, at which they may not take place. Their most frequent seat is at the interval between the two recti abdominis; they have been observed also in the linea semi-lunaris*; and at the sides of the belly, between the ilium and the last rib†. When they occur in the linea alba, above the umbilicus, they seldom acquire a

* Mr. COOPER has seen it here in three instances, and the tumour was below the level of the umbilicus in all. Pt. 2, p. 58.

† PETIT mentions a hernia as large as a child's head between the back of the crista ilii and the last rib. The tumour usually disappeared in the recumbent position. *Tr. des Mal. Chirurg.* t. 2, p. 257. RAVATON met with a rupture in the lumbar region. *Traité des plaies d'armes à feu*; obs. 60.

large size; and in this situation they have been called by the French* "herniæ of the stomach." There is a different species of the complaint, consisting of a general yielding of the muscular or tendinous parietes, which are distended into the form of a large tumour. As the viscera are not protruded in this case from the cavity, it does not seem to come properly under the denomination of a rupture; but it is considered here in compliance with the arrangement usually observed. This is noticed most frequently in the linea alba†, and has been called by the French‡, "éventration." Ventral ruptures of all descriptions are much less common than the species hitherto described.

Since there are no natural openings in the abdominal parietes, in those situations where ven-

* GARENGEOT, *Mémoire sur plusieurs hernies singulieres. Mem. de l'Acad. de Chir.* t. 1.

PIPELET, *Nouvelles observations sur les hernies de la vessie et de l'estomac.* ibid. t. 4.

† Yet it may occur in other parts. RICHTER mentions an instance of a large and broad tumour, equal to a woman's breast in extent, in each groin of the same individual, which seems to belong to this description of the disease. *Tr. des H.* p. 8. He quotes an example of the same kind of hernia from HENKEL, *Chirurg. operat.* b. IV. p. 76.

‡ See PETIT, lib. cit. p. 258 et seq; 268 et seq.; and SABATIER, *de la Medecine Operatoire*, t. 1, p. 178.

tral ruptures occur, it appears difficult at first to account for their formation. Small bloodvessels and nerves come through the muscles to the integuments, and it has been conceived that the openings, for transmitting these, when larger than usual, may favour the occurrence of herniæ: but this explanation is at best very doubtful. Such apertures are not noticed in the linea alba, where ventral herniæ usually occur: and, although they are numerous in the aponeurosis of the obliquus externus, they are completely shut up towards the abdomen by the muscles situated behind that aponeurosis. These ruptures sometimes take place suddenly, from a considerable bodily exertion, and with a sense of laceration, or of something giving way. It is certain that the abdominal muscles are strongly contracted on such occasions, and we can conceive that some part may be actually torn, so as to give rise to the rupture. A case, which I lately examined, clearly proves that such lacerations do occur. A woman, who had been admitted into St. Bartholomew's Hospital in December, 1809, for a strain, caused by lifting a heavy table, died there from an attack of inflammation in the chest. She had complained merely of pain in the loins on her admission. Both the recti abdominis muscles were lacerated through about one third of their thickness; and there was a small quantity of

coagulated blood about the torn fibres. The sheath was not at all ruptured*.

Penetrating wounds of the abdomen are generally followed by ruptures. A case of this kind is related at p. 23: and, in an instance observed by Mr. WARDROP†, where a piece of wood had penetrated the cavity half way between the spinous process of the ilium and the pubes, an enterocele of six inches in length by four in breadth, with very thin coverings, and easily reducible, took place. It has been asserted that abscesses in the muscles are followed by ventral ruptures‡: blows too seem to have produced them in some instances. They could hardly occur in the situation of the recti, or where the abdomen is covered by the three broad muscles at the side, without some previous injury to the parts, as from a wound. The distension of the belly in pregnancy is favourable to the occurrence of ventral herniæ; and particularly to that

* There is a case in the Parisian Journal, in which the peritoneum and abdominal muscles were torn across for the space of three inches by a fall from a considerable height, v. 1, p. 366.

† COOPER, pt. 2, p. 60.

‡ "A l'égard des abcès, pour qu'après leur guérison, ils "laissent une disposition à la hernie, il faut que la matiere "qui les forme, se trouve logée entre le péritoine et les "muscles. J'ai vu deux fois ce cas, et l'un et l'autre à la "suite des grossesses." PETIT, lib. cit. p. 259.

description, in which the parietes yield through a large extent.

The peritoneal sac of a ventral hernia is covered by an exterior investment produced by the condensation of the surrounding substance: and this is again covered by the integuments. Those, which follow wounds or abscesses, are said to have no sac; because, as it is alledged, the divided peritoneum does not unite again. I believe that this point has not been proved by any well authenticated facts. The opening, through which the parts protrude, is large in proportion to the tumour; hence they are easily reduced, and seldom strangulated. The sides of the aperture are tendinous, when the rupture occurs in the linea alba; but they will differ in this respect according to the situation of the protrusion. The symptoms and the treatment of ventral hernia in general are the same as those of ruptures in other situations.

The ventral herniæ, which take place at the scrobiculus cordis, were named herniæ of the stomach by the French writers, from an opinion that they contained a portion of that viscus. Their symptoms are such as denote ordinarily stomachic affection; but I believe that the stomach has never been seen in one of these rup-

tures*. They are generally small, so that frequently there is no perceptible external tumour: but they may equal the fist in bulk. They cause, without being strangulated, various symptoms, which are often referred to other sources, and can be cured only by discovering the true nature of the complaint. This will probably be accomplished by observing the inexplicable obstinacy of the symptoms, and attending to the rule of examining carefully all the ordinary seats of herniæ in these affections, where the stomach and bowels are implicated. The pressure and irritation experienced by the protruded part must be regarded as the cause of the symptoms. The patient feels a pain and dragging at the stomach; and the epigastric region is sometimes so sore that even the pressure of the clothes is troublesome. Digestion is disturbed; and to such a degree, occasionally, that the lightest food irritates the stomach. Vomiting, hiccough, and nausea, are not unfrequent attendants; particu-

* La Peyronie found a portion of the colon in a small ventral hernia, which had caused, during life, the symptoms ascribed to herniæ of the stomach. *Mem. de l'Acad. de Chir.* t. 4, p. 198. Littre found the same intestine in a rupture situated three fingers breadths above the navel. *Sur une hernie rare,* in the *Mem. de l'Acad. des Sciences,* année 1714. It seems much more probable that this bowel should be protruded in such cases, than the stomach.

larly after taking food. There is sometimes constipation and lowness of spirits. Such a train of symptoms must necessarily induce considerable debility. They are generally augmented after eating, and are considerably diminished, or disappear entirely, when the patient lies down. The tumour will be more sensible in the erect posture, or when the body is bent forwards, and cannot be distinguished in the recumbent position. Perhaps the fissure may be felt; and an impulse against the finger will then be distinguished on coughing. The treatment of these cases requires the return of the protruded parts, which is very easily effected, and the prevention of any fresh protrusion by the pressure of a truss. In this simple way patients have been recovered from a condition of considerable apparent danger*. The observations, which have been made on the bandages for umbilical herniæ, will apply to the cases now under consideration.

The dilatations of the linea alba, called by the French "eventrations," may vary considerably in their degree. They may include only a

* "J'ai plusieurs fois vu des malades attaqués depuis "longtems de nauseés, d'envies de vomir, de coliques et de "constipations, auxquels on administroit des medicamens "de toute espece sans aucun succes, et qui ont étés gueris, "comme par enchantement, par l'application d'un bandage "qui retenoit une hernie ventrale a peine sensible."

SABATIER, *de la Medecine opératoire*; t. 1, p. 176.

small part of this line, or its whole length. The tumour will have an elongated figure in either case; and the margins of the opening are formed by the recti muscles. Pregnancy particularly disposes to this affection, which seems almost confined to the female sex. Sometimes the interval between the recti is unusually broad, and the linea alba weak: such a formation would be favourable to this kind of rupture. There is no danger of strangulation, since the base of the tumour is usually the broadest part: and the opening in all cases is very free. An observation recorded by PETIT* shews us to what extent these dilatations may proceed, and should inculcate the necessity of an attention to them in their commencement. An infant, in whom a weakness of the linea alba was observed, wore for a long time a corset, that laced in front, and supported the whole abdomen. This was left off at the age of four or five years; and she grew up without experiencing any inconvenience. She was seen by PETIT in the sixth month of her first pregnancy; at which time there was an enormous tumour containing the gravid uterus, besides intestines and omentum, and formed by the

* Lib. cit. p. 270. HENKEL relates similar instances. *Chirurgische operationen*, b. 4. See also the memoir of GARENGEOT already quoted.

yielding of the linea alba. She had experienced occasional attacks of colic and vomiting; which had become more and more violent and frequent. Garengeot saw a case of this kind, in which the tumour hung half-way down the thighs; and La Peyronie communicated to the French academy of surgery two instances of the same description*.

The treatment of these cases must be modified according to their extent. When the swelling is small, a truss, with a pad suited to the form of the opening, may be employed: but, in more extensive affections a broad band lacing before or behind, and combined perhaps with a compress on the part, will be necessary.†

* *Mem. de l'acad.* t. 1, p. 701.

† "Il n'y a pas longtemps que j'ai été consulté avec plusieurs de mes confréres, pour une hernie de cette espéce, qui étoit audessus du nombril. Lorsqu'on posoit le doigt sur l'écartement des muscles, et que le malade faisoit effort pour lever la tête de dessus l'oreiller, ce doigt se trouvoit serré et embrassé sur les côtés. Il y avoit de vomissemens frequens et douleureux, qu'on ne pouvoit attribuer a aucune autre cause, puisque le jeune malade se portoit bien d'ailleurs. Nous conseillâmes un corset, qui se laçât par derriere, pour rapprocher les muscles, et qui portât anterieurement une pelotte platte et large pour soutenir la ligne blanche. Une autre fois j'ai vu une tumeur herniaire de forme alongée, dont la grosseur égaloit celle d'un pain de demi-livre. Le malade avoit sept à huit ans comme le premier. Mes conseils avoient été à peu près les mêmes."—Sabatier *de la med. operat.* t. 1, p. 178.

CHAP. XX.

HERNIA OF THE BLADDER, OR CYSTOCELE.

THIS kind of rupture takes place most frequently through the abdominal ring: it has been observed also at the crural ring, in the perineum, and the vagina. When we consider that the fundus of the urinary bladder, in the natural state, rises above the pubes only when the cavity is considerably distended, and that its anterior surface is connected by cellular membrane to the surrounding parts, it seems difficult to account for the protrusion of the organ; and the occurrence is indeed rare. But the examples are so well authenticated, as to remove all suspicion as to the fact. Experience has shewn, not merely that the bladder may be protruded at the abdominal ring, but that it may descend even to the bottom of the scrotum. Cases too are recorded, in which this organ is said to have been contained in an ingui-

nal and vaginal rupture of the same subject,* and in a bubonocele on both sides of the body.†

It is necessary to the occurrence of a cystocele, that the bladder should be placed immediately behind, or very close to the ring; and that it should hold that situation when empty: for the distended condition of the organ is obviously so very unfavourable to a protrusion, that it can hardly be deemed possible in that state. Repeated distensions of the bag from any cause must therefore be regarded as particularly disposing to this kind of rupture: and the lateral extension of the viscus in pregnancy facilitates its occurrence. We often discover the bladder on dissection adhering, in such cases, to the back surface of the abdominal muscles, instead of having its fundus behind the pubes. These causes however exist in abundant instances, without giving rise to herniæ of the bladder; and the latter complaints cannot, in many cases, be traced to any causes of the nature now alluded to.

† LEVRET, *obs. sur les polypes*; p. 145 : quoted in RICHTER, *tr. des hern.* ch. XLII.

* See the excellent memoir of Mr. VERDIER, entitled *Recherches sur la hernie de la vessie*, in the *Mem. de l'acad. de chirurg.* t. 2, p. 22.

If the bladder, either from being naturally large, or from having its capacity increased in consequence of retention of urine, is placed behind the ring, when undistended, it may be propelled through the opening just as easily as any other of the abdominal contents. In this case a portion of the anterior surface is first protruded; and, as this is connected by cellular substance to the surrounding parts, without possessing a peritoneal covering, the rupture in this stage possesses no hernial sac. When we observe the fundus of the bladder, in retensions of urine, rising to the umbilicus or higher, notwithstanding the cellular adhesions which unite it to the pubes, we shall conclude that these connexions will not prevent the rupture from increasing under the continued action of the same causes, which first produced it. The neighbouring part of the fundus or side of the bladder, where it is covered by peritoneum, is gradually drawn through the ring, and forms a kind of hernial sac, which has a very different relation to the protruded part of the bladder, from that which the peritoneal covering bears to the contents of an ordinary rupture. It forms a membranous cavity, ending below in a cul de sac, opening above into the abdomen, and lying in front of the bladder, to the anterior surface of which its pos-

terior half closely adheres. The omentum or intestines may easily descend into this pouch; and thus an omental or intestinal rupture will be superadded to the hernia of the bladder. It has not been ascertained whether these protrusions occur in the course of the abdominal canal, or come directly through the opening in the aponeurosis of the obliquus externus. If the situation of the upper opening be compared with that of the bladder, it would seem very difficult for a cystocele to take place at that aperture; while its occurrence at the lower opening can be very readily conceived. It was noticed in one case that the spermatic vessels were on the exterior side of the hernia.* When the protruded part descends into the scrotum, it will probably lie in front of the spermatic chord; even although the latter part should have been placed exteriorly to the swelling at the ring.

As a cystocele may give rise, in the manner already described, to a protrusion of intestine or omentum, so an enterocele or epiplocele may cause a descent of the bladder. The symptoms of the latter occurrence have not been observed in many instances until long after the patients had

* Keate's *cases of the hydrocele, &c. to which is subjoined a singular case of hernia vesicæ urinariæ, &c.* 8vo. London, 1778.

been incommoded by an intestinal or omental hernia; and it has even been suggested that the former is always preceded by the latter complaint. But this is contrary to experience, which has shewn us that a protrusion of the bladder may exist alone.

The manner in which an ordinary omental or intestinal rupture may become complicated by the addition of a cystocele, can be easily understood, when we consider that the peritoneum forming the sac was placed immediately behind the ring, and is continued over the fundus of the bladder. If the original hernia be neglected, its increase elongates the hernial sac, gradually drawing into the ring that portion of the peritoneum, which is attached to the bladder, and the bladder itself, if it be disposed to yield to this force. Thus a portion of this organ becomes situated behind the cavity of the first rupture.

The anatomical description will be just the same in this, as in the preceding case. The protruded portion of the bladder is here interposed between the original hernia and the spermatic chord. The posterior surface of the sac, at its upper part at least, consists of the peritoneum covering the fundus and back of the bladder: and the proportion of the bag formed in this way depends on the extent of the protrusion.

A bubonocele taking place through the abdominal canal gradually brings the upper opening behind the lower one, so that we can conceive the possibility of the bladder being drawn through the ring in the subsequent increase of the swelling. But the relative positions of the opening, and the bladder, render the occurrence of cystocele more probable as a consequence of the ventro-inguinal rupture. These points have not yet been determined by actual observation.

It will be obvious from the preceding account, that the urinary bladder must be very differently circumstanced, in respect to its covering of peritoneum, from the more ordinary contents of hernial swellings. When the anterior part of the viscus is protruded, without the fundus being drawn into the ring, it will be every where adherent by cellular substance, and possess no sac at all. This was the case in an instance recorded by Mr. Pott*, where, however, the bladder had descended to the bottom of the scrotum. When the fundus or side have been protruded, the posterior part of the swelling only adheres to the surrounding parts, and there is a bag formed by the peritoneum in front. The cellular adhesions in both cases are such as

* See the "*observations on ruptures,*" in the third vol. of his works; case xxiii.

to render the return of the protrusion impossible. Although the natural connexions might be expected to oppose any considerable displacement of this bag, we find that a very large portion of it may quit the abdomen, descending to the bottom of the scrotum, and forming, when full of urine, a very considerable tumour *. The part undergoes further changes after it has passed through the ring. It becomes contracted in the opening, and expands again below. Mr. KEATE "found it contracted at the ring, dilating itself again in the abdomen and pelvis, and forming a kind of double bag, divided by the ring†." And the same change had occurred to a still greater extent in an instance operated on by Mr. POTT. He discovered a membranous bag, growing narrower as it proceeded upwards; and a membranous duct, about the size of a large wheatstraw,

* In the case already quoted from MR. KEATE, the greatest part of the bladder was in the scrotum; and many instances, where the tumour was considerable, are recorded. See MERY, *Observations sur differentes Maladies*, in the *Acad. Roy. des Sciences*, an. 1713. RUYSCH, *Observat. Anatomico-chirurg. Centuria*; *Obs.* 98. VERDIER, in the *Acad. de Chir*; t. 2, pp. 15, 20. POTT's *Works*, vol. 3, p. 323.

† P. 41. BERTRANDI mentions an analogous case, in which there seems to have been also some formation of stone. "Vidi porro ego herniam vesicæ urinariæ, cujus transitus per annulum musculorum abdominis ita fuerat coarctatus et ob-

was continued from its upper end through the ring. The urine flowing through this, when it was divided, proved the case to be a hernia of the bladder*. Stones have been contained in the protruded portion in many instances†.

The symptoms of cystocele will be different, according as the protruded portion is full or empty; confined to the groin, or continued into the scrotum; and simple, or combined with intestinal or omental rupture. When the part is empty, its volume is not considerable, the sides collapse, and examination discovers nothing but a soft membranous subtance rolling under the fingers. But the most characteristic circumstances arise from the state of the urinary evacuation. When there is a frequent desire to expel the urine, with occasional retention; when the tumour increases after retaining the water for some time, and is diminished, or entirely disappears on voiding the urine, the case must be a cystocele. The patient sometimes feels unable to expel the urine, without elevating and compressing the tumour; but

struetus, ut nisi perfracto tartareo quodam cæmento tenuem stilum trajicere possemus."

Mem. de l'Acad. de Chir. t. 3, p. 103.

* *Works*, v. 3, p. 327.

† Bartholini, *Hist. Anat.* cent. iv. hist. 28. *Acad. de Chir.* t. 2, pp. 10, 13, 15. In the first of these cases there were four stones. Pott, v. 3, p. 327.

he can accomplish it easily by that means. After voiding all that he can, a further desire to make water is excited by pressing the swelling. When the bladder has descended into the the scrotum, and is full of urine, it might be mistaken for hydrocele. The dysury, the power of diminishing the swelling by pressure, and the desire of making water consequent on this, sufficiently distinguish the case. To the peculiar symptoms of cystocele will be added those of an intestinal or omental rupture, when the affection is complicated. In some cases the protrusion of the bladder has been attended with no symptoms. Its existence was not known until after death, in Mr. KEATE's case, where the greatest part of the viscus had passed into the scrotum: and the same observation may be made concerning a case related by ARNAUD*.

Surgical treatment can avail very little in herniæ of the bladder. The part cannot be replaced, and we must therefore be contented to support and press on the tumour by means of a suspensory bandage. If its existence were discovered in an early stage, perhaps it might be reduced by the constant pressure of a truss with a hollow pad. It seems to be hardly susceptible of strangulation. If a stone were discovered in

* *Mem. de Chir.* p. 78.

it, we ought to remove it by an incision. No ill consequence followed in two instances, where openings had been made in the protruded portion of the bladder *.

Hernia of the bladder, under the crural arch, is very rare: one case is mentioned in the memoir of VERDIER †.

The protrusion of the organ in a perineal or vaginal rupture will be indicated by the peculiar symptoms connected with the urinary evacuation. Its treatment does not differ from that of other ruptures in the same situations.

* *Acad. de Chir.* t. 2, pp. 11, 13. † P. 23.

CHAP. XXI.

PERINEAL RUPTURE.

INSTANCES are recorded of herniæ at the lower aperture of the pelvis. The parts descend in the male subject between the rectum and bladder, pass between the fasciculi of the levator ani, or between that muscle and the sphincter, and form a tumour in the perineum: this is usually seen on one side of the raphe. In the female they pass between the bladder and vagina; yet, although the pelvis seems to be more filled up than in males, and the vagina offers a convenient situation for protrusion, most of the examples have occurred in the former sex.

As the rectum touches the vagina in the female, and the bladder in men, by its superior surface, we should naturally expect that the bowels would escape rather by the side of these viscera, than in the middle of the perineum.

Since there is a very considerable distance between the reflection of the peritoneum from the rectum to the vagina or bladder, and the surface

of the body, we can easily conceive that an imperfect protrusion may take place, without forming any exterior swelling. Such an occurrence can be discovered by dissection only; and we cannot recognise the perineal hernia, until a tumour appears externally.

The contents of these ruptures have been some portion of the intestinal canal, or, as it is stated, of the urinary bladder. The swelling possesses the ordinary characters of a rupture. It becomes larger and more tense in the erect position, or when the patient holds his breath; smaller and softer when he lies down; and disappears entirely on pressure. It occasions various intestinal affections. From its immediate vicinity to the neck of the bladder, it must constantly press upon and irritate that viscus in the male subject. In the female it will cause a tumour at the posterior part of the vagina, and it must form a swelling perceptible from the rectum in both cases. When the bladder is protruded, the peculiar symptoms mentioned in the last chapter will point out the nature of the case.

The treatment consists in replacing the parts, which may be facilitated by introducing the finger into the rectum or vagina, and preventing them from descending again by means of external pressure. This may be applied by means of the T bandage; of which the portion passing between the

thighs is furnished with a suitable compress, either of ivory, or of softer materials, adapted in shape to the part. The introduction of a pessary into the vagina, by keeping that cavity distended, will prevent protrusion in the female subject.

SMELLIE has an instance, which will be mentioned below, of incarcerated perineal hernia. It would be the duty of the surgeon, if he met with such a case, to attempt relief by an operation.

The first observation of a perineal enterocele is ascribed by SABATIER to Mr. CHARDENON, a surgeon of Dijon. In examining the body of a patient, who had died of an acute disease, he noticed the ileum descending into the middle of the pelvis between the rectum and bladder. The intestine gave way suddenly, as he was endeavouring to draw it up, and a hernial sac, of the size of a pigeon's egg, came into view. It had a contracted entrance, with a hard and callous edge. By introducing a finger into the cavity, it could be distinctly ascertained that the sac was covered only by integuments; and when the latter was distended with lint, a tumour was observed externally*.

The existence of this rupture was also ascer-

* This account of the case is given in RICHTER, chap. xli. from LE BLANC's *Précis d'Opérations*, t. ii. p. 244.

tained after death in a male subject, brought for dissection to the anatomical school at St. Thomas's hospital. The peritoneum here formed a bag of an elongated shape, between the rectum and the under surface of the bladder and prostate. But its lower extremity did not reach the skin, so as to form any tumour. The mouth of the sac was two inches and a half from the anus. The case is represented in Mr. Cooper's work*.

SMELLIE has two examples of perineal rupture in his *Collection of Cases and Observations in Midwifery*. In the first of these there was a swelling at the left side of the anus, which had formed gradually; disappearing in the recumbent, and coming down again in the erect posture. Labour-pains came on while the hernia was down, and considerable inflammation with strangulation ensued; the delivery was followed by a large discharge of blood; discutient fomentations and cataplasms were ordered to the part, and the swelling was reduced soon after. It appeared again in the following labour, when SMELLIE introduced his hand into the vagina and pushed it

* Pt. 2, p. 67; and pl. 11, fig. 3. BROMFIELD, in his *Chirurgical Observations*, v. 2, p. 264, relates the case of a boy, in whom the small intestines protruded through the wound during the operation of lithotomy. This has been deemed an instance of perineal hernia, but it appears rather doubtful.

up, the child's head immediately descending into the pelvis*. In the second case, a swelling appeared at the left side of the perineum and anus about a month after delivery. It increased considerably, protruding at first only when the patient was in the erect posture; and she could reduce it by introducing two fingers into the vagina. She became pregnant, and was seized with a violent cough, which enlarged the swelling to the size of a fist, and rendered reduction very difficult. Great pain was experienced in the parts as she increased in bulk, and about five weeks before labour, the swelling became quite irreducible. After this had continued for some days, SMELLIE found her in great agony, with the surface of the tumour livid. It burst, and gave issue to a spoonful of pus mixed with blood, and afterwards to half a pint of a blue greyish fluid. She was immediately relieved, and exclaimed that the intestine had gone up. Although the fluid, supposed by her attendants to come from the intestines, still continued to escape, she recovered quickly, went her full time, and was delivered without any unpleasant occurrence. A little fluid still oozed from a small orifice some months after delivery; she continued subject to occasional violent pain and constipation; the rupture appeared again, in consequence of an effort, but it was reducible†.

* P. 144. † P. 145.

Mery saw a tumour larger than a hen's egg, between the os externum and the anus, in a woman about five or six months gone with child. She experienced difficulty and pain in making water; but when he pressed the tumour it disappeared, and urine was voided*.

Another example is recorded by Mr. Verdier†. A lady, in the sixth month of pregnancy, consulted a surgeon for a difficulty in making water. There was a tumour on one side of the perineum. A fluctuation could be perceived in this; it disappeared on pressure, and came down again when the compression was discontinued. When considerable force was used, a small quantity of urine escaped through the urethra. The swelling went away after parturition, and came on again at the end of the second pregnancy. It was now considerably larger, and occupied the whole perineum. It was treated with compresses and bandage.

Mr. Pipelet‡ relates a case, which he conceives to have been a protrusion of the urinary bladder at the perineum of the male subject. A considerable exertion in leaping was followed by a very severe pain in the perineum; and the

* *Mem. de l'Acad. des Sciences*, année 1713.

† See his Memoir already quoted, p. 25.

‡ *Mem. de l'Acad. de Chirurgie*, t. 4, p. 182.

patient constantly felt after this time an uneasiness, with a sense of weight in the part. But he complained chiefly of being able to make only a small quantity of water at a time; and of being obliged to press on the swelling, in order to facilitate the process. This pressure, however, procured a more abundant discharge of urine. The swelling was oblong and soft, and equal in size to a hen's egg. It could be easily reduced. Compresses and a bandage kept it up.

CHAP. XXII.

VAGINAL RUPTURE.

THE tumour, in this case, is contained in the cavity of the vagina, and its external surface is formed by the membrane of that canal. The peritoneum is continued from the back of the bladder to the front of the uterus, without covering any portion of the vagina. When the membranous cul de sac formed between the two organs is pushed downwards, a swelling takes place at the upper and back part of the vagina. From the rectum the peritoneum is continued to the inferior surface of the vagina, of which the posterior half is covered by that membrane. A protrusion in this situation must form a swelling at the lower and middle part of the canal. The immediate contact of the vagina with the rectum and bladder prevents this kind of tumour from presenting exactly at the middle of the upper or lower surface of the canal, and occasions it to assume generally a lateral position.

The situation, in which the protrusion begins, is the same as in the perineal rupture; but the difference between the two cases is, that the vagina, which resists in the latter, yields in the former instance. Hence we should expect, what we find by experience to be true; viz. that women who have had children are the most subject to this complaint. The distension of the vagina and surrounding parts in such persons must weaken the powers of resistance. It may occur, however, in females who have never borne children*. The small intestine seems to be the part most frequently protruded: the urinary bladder sometimes descends, and the tumour then is on the anterior or upper surface of the vagina. The causes of the complaint do not differ from those of other ruptures: it has generally been formed in consequence of bodily exertion, as in raising a great weight, straining at stool, &c. Hoin† mentions the case of a young girl, subject to constipation, who was obliged to use violent exertion

* Richter, p. 268. Cooper, pt. 2, pp. 65 and 66.

† In his "*Essai sur les Hernies Rares, et peu connues,*" published in Leblanc's *Nouvelle Methode d'operer les Hernies;* 8*vo. Paris,* 1768. This work, which I have not seen, is quoted by Richter. The author mentions another instance in which the complaint occurred on the seventh day after parturition, from lifting a pitcher of water.

in expelling the feces: a vaginal rupture occurred from an effort of this kind.

The swelling is soft and equable, increasing by standing, and diminishing, or entirely disappearing when the patient lies down. It becomes more tense when the patient holds her breath, and an impulse is felt in it on coughing. The contents can be readily pushed up by the hand; but they descend again if the patient coughs or strains. An increase of the swelling, with a very painful sense of bearing down, and of something giving way, precludes all laborious exertions, when no means have been employed to remedy the complaint. Disorders of the alimentary canal are often present. Frequently the bladder is affected, from the immediate vicinity of the tumour; and the symptoms connected with the urinary evacuation will be more marked where this bag itself is protruded. In such a case pressure on the swelling occasions a discharge of urine through the meatus urinarius. The nature of the case is sufficiently pointed out by the characters already enumerated; but the possibility of a mistake is still further precluded by the power of feeling the os uteri in its natural state and situation behind the swelling.

The treatment of the case will consist in returning the parts by the pressure of the hand; and here the surgeon must remember, that the

passage, by which the contents of the swelling descend, is of considerable length, consequently that a portion of intestine may be contained in it, although the obvious tumour be reduced. Hence we should press on the surface of the vagina as far as the os uteri, so as to remove whatever might be contained in the neck of the sac. When complete reduction has thus been accomplished, future protrusion must be prevented by the use of a pessary. Since this object cannot be obtained without distending the sides of the vagina, pessaries of the common form are not sufficient. The globe-shaped instrument has been found to answer; but the hollow cylinder is the most suitable.

If any difficulty should be experienced in the reduction, the recumbent position, and the use of clysters would probably be sufficient to overcome it. But the most serious inconvenience would arise from the rupture protruding during parturition; and this consideration should lead us to adopt every measure which can obviate such an occurrence. Pressure should be made on the opening during the pains, until the head has descended into the pelvis; or, if the tumour is down, it should be pushed back into the abdomen, by introducing the hand into the vagina*; but

* Smellie's *Cases*, p. 148.

if the head has descended, perhaps it would be best to accelerate the delivery as much as possible.

SANDIFORT* had an opportunity of examining a vaginal enterocele after death. A large oval tumour, in an old woman, proceeded from the back of the vagina, and protruded at the orifice of that canal. Its contents could be pushed back into the abdomen, but speedily returned. He found in it a very large portion of the small intestine, which entered by a round hole between the vagina and rectum. The cavity was lined throughout by peritoneum.

The following case, related by GARENGEOT†, is considered to have been the first distinct notice of the vaginal rupture. A woman, who had borne five children, felt an acute pain in the vagina, in consequence of lifting a burthen. At the same time a swelling took place in the part. This gradually increased, until it passed the os externum. The patient felt occasional colicky pains, with dragging at the stomach, and difficulty in voiding the urine. GARENGEOT felt the os uteri in its natural situation behind the tumour, and

* *Observat. Anatomico-Patholog.* lib. i, cap. 4. "De hernia intestino-vaginali, aliisque hujus morbi speciebus."

† *Mem. sur Plusieurs Hernies Singuliéres,* in the *Acad. de Chir.* t. .

found the latter diminished by one-half, in consequence of his examination. On making the patient lie down, he easily pushed back all the contents of the swelling, when the upper and right portion of the vagina felt lax and thin. He now made her rise, walk about, and cough, which brought down the tumour again. After replacing it, he introduced an oval pessary, which succeeded for the first day; but, on the second, pain and vomiting came on, in consequence of the intestine being compressed between the instrument and the pubes. A hollow cylindrical pessary was then substituted, and kept up the parts completely. ARNAUD had employed the same means in a similar case.

A large protrusion of the bladder into the vagina is recorded by SANDIFORT*. Retention of urine, and difficulty of introducing the catheter, followed a violent cough. A large tumour occupied the whole cavity of the vagina. Fluctuation could be felt in this, but no urine was evacuated on pressure, unless the catheter was introduced at the same time; then a plentiful evacuation ensued, but the contents were not entirely discharged, unless the compression was continued. When all the urine had been drawn off, the catheter

* *Obs. Anat. Pathol.* l. i, cap. 3. De hernia vesicæ vaginali.

could be easily introduced; the tumour disappeared; the superior part of the vagina felt lax and flaccid; and the finger could be pushed up to the mouth of the uterus, till the swelling began again to increase by the urine collecting in the bladder. The use of a pessary produced a perfect cure. Three other cases of large swellings in the vagina, reduced by the employment of the catheter, and again increasing, were communicated to SANDIFORT by a very skilful physician, who practised midwifery.

Mr. COOPER* mentions two cases in which the urinary bladder was protruded at the upper and front part of the vagina. Pressure on the swelling occasioned a discharge of urine, and left the part loose and flaccid. The swelling came on again, as the urine collected. RICHTER† saw two instances in which the tumour was not larger than a nut.

Pudendal Hernia.

In the second part of his work, Mr. Cooper has described, under this name, a peculiar case very much resembling the vaginal hernia. The

* Pt. 2, p. 66. † P. 270.

parts descend along the surface of the vagina; but, instead of protruding the side of that canal, pass between it and the levator ani, and form a tumour in the middle of the labium pudendi. Such a case resembles the vaginal rupture in its origin, and the perineal in the circumstance of being protruded at the edge, or between the fibres of the levator ani. The situation of the swelling may cause it to be mistaken for bubonocele; but the distinction arises from the upper part of the labium being completely free in this case, whereas the swelling of an inguinal hernia extends into the ring. The characters of the tumour possess no peculiarity. Its continuation along the side of the vagina may be felt by introducing the finger into that canal. It should be treated in the same manner as a vaginal hernia. The following case is related in Mr. Cooper's work.

A young woman, aged twenty-two, laboured under the symptoms of a strangulated hernia. A swelling, equal in size to a pigeon's egg, occupied the left labium: it had frequently descended during the last six months, but the patient could reduce it herself with little effort and little pain. The tumour was placed below the middle of the labium; the upper part of which, and the abdominal ring, were perfectly free from tumefaction: it could be traced along the side of the vagina, nearly as high as the os uteri. An impulse was

felt on coughing. "I then," says Mr. C." "grasped the swelling, and pressing on it with some little force, which gave her a great deal of pain, in about three minutes it went up with a guggling noise, and she became easy. The labium then felt flaccid, as if a tumour had been taken from it, and when the finger was placed in this flaccid and hollow portion of skin, it could be forced back into a circular orifice on the inner side of the branch of the ischium, and between it and the vagina. The only method she has since used to keep the hernia up, is to wear a common female bandage between the thighs, and fixed around the abdomen."

CHAP. XXIII.

RUPTURE AT THE FORAMEN OVALE OF THE PELVIS.

A CONSIDERABLE oblique notch is observed on the under surface of the horizontal branch of the pubes; and a deficiency exists under this part in the obturator ligament, so as to leave a sufficient space for the passage of the obturator artery, vein, and nerve. This foramen is larger than would suffice for transmitting the parts: it is formed above by the notch of the pubes, at the sides and below by the margin of the ligament. Protrusions of the abdominal contents have taken place through it, and have been described under the names of obturator or thyroideal hernia.

It seems that the elder ARNAUD* had first noticed this peculiar kind of rupture; and DUVERNEY† afterwards met with it in the dead sub-

* *Mem. de l'Acad. de Chir.* t. i, p. 711.

† Ibid. p. 714.

ject. His observation was communicated to the Royal Academy of Sciences, but is not printed in their memoirs. On both sides of the pelvis of a female, the peritoneum had been protruded through the openings, at which the obturator vessels pass, so as to form swellings, each of which was about the size of an egg. These contained intestine, were placed between the anterior heads of the triceps, and formed no external tumour. GARENGEOT had become acquainted with the facts noticed by ARNAUD and DUVERNEY; and has related some other cases in his *Memoire sur plusieurs Hernies singuliéres**, the first publication in which the existence of the obturator hernia was clearly proved. Besides the case of DUVERNEY, this memoir contains a similar fact noticed by Mr. HOMMEL, of the Anatomical Theatre at Strasburg. He observed the peritoneum protruded through the obturator holes, and forming swellings equal to pigeons' eggs; and shewed the parts to GARENGEOT†. Subsequent experience has so amply confirmed the fact, that no doubt can remain on the subject.

HEUERMANN‡ found a piece of ileum, equal in length to a finger and a half, protruded at the

* Ibid. pp. 709—716. † Ibid. p. 716.

‡ *Chirurgische Operationen*, b. i, p. 578; quoted in RICHTER, p. 296.

foramen ovale. The sac was covered by the first and second heads of the triceps, and the pectinalis. An entero-epiplocele has been seen in the same situation in a young man, seventeen years of age*. CAMPER† and Mr. COOPER‡ have seen small protrusions of the peritoneum at the passage of the obturator vessels in the dead subject; and an opportunity once occurred to myself of observing a similar fact. There was a small pouch, capable of holding the last joint of the little finger, on each side of a female subject. In this, as well as in Mr. COOPER's case, the blood vessels were behind the sac.

In the cases now enumerated, the complaint was not discovered until after death; and, when we consider how the tumour is surrounded by the muscles of the thigh, we shall not be surprised at finding that it has caused no external

* KLINKOSCH, in *Dissertation. med. Pragens.* vol. i, p. 185; quoted in RICHTER, p. 296.

† "Memini me in cadavere macilenti senis peritonæi dilatationes, profunde juxta obturantia vasa sinum ingredientes in utroque latere vidisse." CAMPER in *Demonstrat. anatomico-pathолog.* lib. ii, p. 17.

VOGEL met with a similar appearance. *Von den Brüchen.*

The nature of the case mentioned by RAVATON (*Traité des plaies d'armes à feu*, p. 306) is doubtful. If it were an obturator hernia, it is an example of fatal incarceration.

‡ Pt. 2, p. 70, and pl. 11, fig. 2. The protrusion was very small, and on the right side of a male subject.

swelling, nor ever exceeded a small size. The pectinalis, the long and middle heads of the triceps, and the gracilis, completely inclose the space into which the sac protrudes, and must by their pressure, prevent it from increasing to any great bulk. These circumstances of anatomical position would undoubtedly lead us to suppose that the complaint could never be recognized during life. Yet we are informed by GARENGEOT that ARNAUD has reduced several obturator herniæ, and kept them up by bandages; that he himself had seen and reduced two such ruptures in the living subject; and that two other instances had been communicated to the Academy. The careful perusal of these facts has not satisfied me that they were obturator herniæ*

* I think there can be no doubt that the two cases mentioned by ESCHENBACH were not, as he represents them, ruptures through the foramen ovale. *Observata anatomico-medico-chirurgica rariora*, 1769, p. 265, et seq.

CHAP. XXIV.

ISCHIATIC RUPTURE.

A FEW cases are recorded, in which ruptures have occurred at the great sacro-sciatic foramen of the pelvis. Since the sac is covered at this point by the gluteus maximus, it could not be perceptible externally, until it had acquired a considerable size ; and the resistance of the muscle would probably oppose its increase. Hence we do not find that it has ever been recognized in the living subject*.

* An exception must be made to this remark, if we admit, according to the general opinion, that the case, described in PAPEN's *Epistola de stupenda Hernia dorsali*, was an ischiatic rupture. A woman, at the age of forty, perceived near the right side of the anus a small tumour, which gradually increased into an immense pendulous bag, hanging down to the knee. She was obliged to lie on the left side, to suspend the tumour from the back, when at work, and to elevate and compress it in order to promote the evacuation of the feces. Frequent borborygmi were heard in the part. It seems that this great infirmity did not materially affect the patient's health, nor prevent her from following laborious occupations, as she died suddenly while employed at harvest-work, and her body was

BERTRANDI* had seen the ileum protruded on the right side in two instances. CAMPER† met with an example on the left side of the female pelvis. The opening of the bag was narrow, and the fundus considerably larger: it contained the ovarium, which was larger than usual. The finger introduced into the sac could be felt distinctly on the outside, notwithstanding the thick external coverings. A case, in which a fatal strangulation of the small intestine took place in the same situation, is recorded in Mr. COOPER'S‡ work. The swelling was small, and its existence not suspected during the patient's life.

very fat. The swelling resembled an oblong flask, narrowest towards the anus, and increasing below. Its length was an ell, and the circumference of the lower part half an ell. It formed a cavity lined by peritoneum, and containing all the small intestine, with part of the large, and of the omentum. The course of the stomach described a perpendicular line, and the pylorus was at the entrance of the sac in the pelvis. The opening at which the parts protruded, is by no means clearly described. The circumstance of the swelling having been perceptible when small, of its situation near the anus, and of its increase to so great a bulk, make me doubt whether the parts had passed out at the sacro-sciatic foramen. HALLERI *Disput. Chirurg.* t. 3.

* *Mem. de l'Acad. de Chir.* t. 2, p. 2, note a.

† *Demonst. anat. pathol.* lib. ii. p. 17.

‡ Pt. 2, p. 73; plates 12, 13.

CHAP. XXV.

STRANGULATION OF THE BOWELS WITHIN THE CAVITY OF THE ABDOMEN.

THE cases considered in this chapter do not fall properly under the description of ruptures; as the incarceration is within the abdomen, as there is no external tumour, and no possibility of discovering the cause of the complaint before death, nor consequently of affording any relief. Suppression of stools is the first symptom: inflammation of the alimentary canal above the stricture, follows sooner or later; this inflammatory disorder extends over the whole cavity, and destroys the patient, insuperable constipation continuing throughout the complaint. The appearances on dissection are the same with those observed in patients who die with strangulated ruptures; (see p. 37.)

A malformation of the diaphragm, consisting of a preternatural fissure, which forms a communication between the abdominal and thoracic ca-

vities, has frequently caused fatal strangulation. Sometimes the deficiency is so great, that a large portion of the abdominal viscera is contained in the chest at the time of birth; and the child dies soon after it is born. In other cases occasional inconveniences have been felt, probably arising from a temporary passage of some viscus into the slit, attended with affections of the respiratory organs, but the fatal termination has not occurred until the adult age. The colon, omentum, stomach, spleen, and left lobe of the liver, are the parts which have been strangulated in these cases. They are found lying in the cavity of the chest, in contact with the lung*. In some

* The recorded instances of this nature are very numerous. I subjoin a few references.

Holt in *Philos. Trans. abridged*, v. 4, p. 630.

Fothergill in *Philos. Trans.* No. 468; or in his *works*, v. i.

Macaulay in *Medical Observations and Inquiries*, vol i, No. 4.

Morgagni, *De Causis & Sed. Morbor.* ep. 54, art. 12 and 13.

Lieutaud *Histor. Anatomico-Med.* t. 1, obs. 212, &c.

Klinkosch *Dissertat. Medicæ Select. Pragens.* t. i, p. 187.

Bonn *Descriptio Thesauri Hoviani.*

Le Blanc *Operations de Chirurgie*, t. 2, p. 414.

Petit *Tr. des Mal. Chir.* t. 2, p. 261, et seq.

Chauvet *Hist. de l'Acad. des Sciences*, 1729, p. 11.

Vica D'Azyr, ibid. 1772, p. 2.

instances it appears that no opening has existed between the two cavities; but the peritoneum and pleura have been protruded between the fasciculi of the muscle, and have formed a hernial sac*. Sometimes a wound of the diaphragm, from a broken rib or other cause, has allowed some intestine to pass into the thorax†.

Membranous cords forming adhesions, have very frequently caused incarceration. These may be attached to any part of the cavity or its contents. The appendix vermiformis, the Fallopian tube, and diverticula of the small intestine, when fixed at their loose extremities to some neighbouring part, by such adhesions, have been the causes of death in this way‡.

Clark in *Transact. of a Society for promoting Medical and Chirurgical Knowledge* v. 2, p. 118.

Medical Records and Researches, art. 1.

Monro *on Crural Hernia*, p. 10.

Cooper *on Crural and Umbilical Hernia*, p. 76, et seq.

* Petit, *Tr. des Mal. Chir*, t. 2, p. 266.

Bowles in *Medical Records and Researches*, p. 15.

† Fab. Hildanus, cent. 2, obs. 33.

Blancard, *Anat. Pract. Rational.*

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Derrecagaix in the *Parisian Chirurgical Journal.*

Cooper, pt. 2, p. 80.

‡ *Giornale di Medicina*, 1, p. 91. Amyand, *Phil. Trans: Abr.* v. 9, p. 124.

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Sacs are sometimes formed in those processes of the peritoneum which consist of two layers; as the mescentery, mesocolon, the process belonging to the sigmoid flexure of the colon, and the ligamentum latum uteri*.

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